A.4.1

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

Toward A Cleaner Environment
15 Year Anniversary 1972 - 1987

Richard F. Celeste
Governor

February 14, 1989

Re: GMC - CPC Norwood
US EPA ID No.: OHD004260089
Ohio Permit No.: 05-31-0441
Completion of Closure Process

General Motors Corporation
Chevrolet Pontiac Canada, Norwood Plant
Attn: W. H. Stanley
P.O. Box 12171
Norwood, Ohio 45212

RECEIVED
FEB 21 1989
RCRA-IMS
U.S. EPA, REGION V

Dear Mr. Stanley:

According to our records, all necessary activities have been completed at your facility regarding closure of a hazardous waste storage area and tanks. Therefore, this letter is to inform you that, based on the information you had submitted and an investigation by Agency staff, you have completed formal closure of all hazardous waste units at your facility.

Should you have any questions concerning your current status, please contact the Ohio EPA, Division of Solid and Hazardous Waste Management, Attn: Patrick Willoughby, 1800 WaterMark Drive, Columbus, Ohio 43266-0149, telephone: (614) 644-2934.

If you intend to no longer pursue your Ohio Hazardous Waste Installation and Operation Permit and wish to withdraw your permit, the following information should be forwarded to Ohio EPA within thirty (30) days:

1. A formal request for withdrawal signed by an authorized representative according to Rule 3745-50-42(A)-(D) of the Ohio Administrative Code (Attachment 1) including a full explanation of your reasons for withdrawal of your application; and,

2. A certification statement signed by the same authorized representative of your facility (Attachment 2).

Upon receipt of the above items, Ohio EPA will review your submission along with any facility inspection report(s). If no additional information is necessary, your permit withdrawal request will be finalized.

Please forward the above information to: Ohio EPA, Division of Solid and Hazardous Waste Management, Attn: Patrick Willoughby, Data Management Section, 1800 WaterMark Drive, Columbus, Ohio 43266-0149.

Please note that you must notify U.S. EPA of your change in status, if you have not already done so.

Should you have further questions concerning this procedure, please call Patrick Willoughby, Data Management Section at (614) 644-2934.

Very truly yours,

Thomas E. Crepeau

Thomas E. Crepeau, Manager
Data Management Section
Division of Solid and Hazardous Waste Management

TC/PW/ds

cc: Lisa Pierard, US EPA, Region V
Hazardous Waste Facility Board
Randy Meyer, TA&ES, DSHWM
Dave Sholtis, S&ES, DSHWM
Dick Robertson/Jeff Hines, SWDO, DSHWM
File

2006R/38-39

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

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SEP - 2 1988
OFFICE OF RCRA
Waste Management Division
U.S. EPA, REGION V

Toward A Cleaner Environment
15 Year Anniversary 1972 - 1987

Richard F. Celeste
Governor

CERTIFIED MAIL

August 30, 1988

Re: CLOSURE PLAN EXTENSION
GM - CPC Group, Norwood Plant
OHD004260089/05-31-0441

Mr. Herb D. Stone, Plant Manager
General Motors Corporation
CPC Group, Norwood Plant
P. O. Box 12171
Norwood OH 45212

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency.

By: Mary Cavin Date 8-31-88

Dear Mr. Stone:

On June 17, 1988, General Motors Corporation submitted a request for an extension to the closure period specified in the approved closure plan to December 16, 1988 (180 days from Ohio EPA's approval of background sampling data). The extension request was submitted pursuant to OAC Rule 3745-66-13(B) as closure will require longer than the 180 days period specified in OAC Rule 3745-66-13. General Motors Corporation has requested this extension because additional time is required to determine the extent of contamination around the Norwood Plant's hazardous waste facilities (i.e., a container storage area, four underground storage tanks, an above ground storage tank and a quantity of hazardous wastewater treatment plant sludge). Ohio EPA concurs that an extension is justified. However, the amount of time requested is excessive and unwarranted. Ohio EPA believes that 180 days from the expiration of the initial closure period is sufficient time to complete closure of the hazardous waste facilities at the Norwood Plant.

Therefore, closure of the Norwood Plant's hazardous waste facilities will require greater than 180 days because additional time is required to determine the extent of contamination around those facilities. General Motors Corporation will continue to take all steps to prevent a threat to human health and the environment from the unclosed but inactive waste management unit per OAC Rule 3745-66-13(B)(2).

The public was given the opportunity to submit written comments regarding the request for an extension to the closure period for General Motors Corporation in accordance with OAC Rule 3745-66-13. The public notice appeared in the week of June 30, 1988 in the Cincinnati Enquirer. No comments were received in this matter.

An extension of time allowed for closure is hereby granted. Closure of the hazardous waste facilities at the Norwood Plant shall be completed by October 19, 1988.

Ohio Environmental Protection Agency
ENTERED DIRECTOR'S JOURNAL

AUG 31 1988

Mr. H. D. Stone - Page Two

Please be advised that approval of this closure extension request does not release General Motors Corporation from any responsibilities as required under the Hazardous and Solid Waste Amendments of 1984 regarding corrective action for all releases of hazardous waste or constituents from any solid waste management unit, regardless of the time at which waste was placed in the unit.

Because the Ohio EPA is not currently authorized to conduct the federal hazardous waste program in Ohio, your closure time extension request also must be reviewed and approved by the USEPA. Federal RCRA closure regulations (40 CFR 265.112) require that you submit a request for extension to George Hamper, Chief, Waste Management Division, Technical Programs Section, Ohio Unit, USEPA, Region V, 5HS-13, 230 South Dearborn Street, Chicago, IL 60604. If the closure period specified in the approved closure plan has passed, approval of an extension by both agencies is necessary prior to continuation of activities required by the approved closure plan.

When closure is completed, the Ohio Administrative Code Rule 3745-66-15 requires the owner or operator of a facility to submit to the Director of the Ohio EPA certification by the owner or operator and a registered professional engineer that the facility has been closed in accordance with the approved closure plan. The owner or operator certification shall follow the format specified in OAC 3745-50-42(D). These certifications should be submitted to: Ohio Environmental Protection Agency, Division of Solid and Hazardous Waste Management, Attn: Tom Crepeau, Program Planning and Management Section, P.O. Box 1049, Columbus, OH 43266-0149.

You are notified that this action of the Director is final and may be appealed to the Environmental Board of Review pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. It must be filed with the Environmental Board of Review within thirty (30) days after notice of the Director's action. A copy of the appeal must be served on the Director of the Ohio Environmental Protection Agency and the Environmental Enforcement Section of the Office of the Attorney General within three (3) days of filing with the Board. An appeal may be filed with the Environmental Board of Review at the following address: Environmental Board of Review, 236 East Town Street, Room 300, Columbus, OH 43266-0557.

Sincerely,

Richard L. Shank

Richard L. Shank, Ph.D.
Director

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency.

By: Mary Cavin Date 8-31-88

RLS/RM/ds

cc: DSHWM Central File, Ohio EPA
Rebecca Strom, USEPA, Region V
Randy Meyer, DSHWM , Ohio EPA

Ohio Environmental Protection Agency
ENTERED DIRECTOR'S JOURNAL

AUG 31 1988

1567U/15

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

June 14, 1988

RECEIVED
JUN 20 1988
U. S. EPA, REGION V
SWB — PMS

Richard L. Shank, Ph.D.
Director, Ohio Environmental
Protection Agency
P.O. Box 1049
1800 WaterMark Drive
Columbus, Ohio 43266-0149

Re: Closure Plant Extension; GMC-CPC Norwood Plant OHDOO 4260089, 5-31-0441

Dear Director Shank:

This is to acknowledge receipt of, and respond to your letter of May 27, 1988, to Douglas G. Haynam, Esq., denying the General Motors Corporation an extension of time to complete closure at the C-P-C Norwood Plant due to a purported insufficient explanation of need. As you requested, this response clarifies General Motors' proposal for an extension to complete closure and should now enable you to grant the extension.

General Motors Corporation, C-P-C Norwood Plant, is prepared to begin additional closure activities for the hazardous waste management units at the Norwood facility, pending Ohio EPA's approval of the background levels we have forwarded to you. There appears to be some misunderstanding as to why additional sampling work was performed by GM under the guidance of OEPA. As discussed below, this sampling was necessary in order to ascertain appropriate cleanup levels for the site and minimize safety hazards.

At the first meeting of representatives of both General Motors and Ohio EPA on November 10, 1987, General Motors requested that Ohio EPA withdraw its approval of the closure plan to allow for development of facts necessary to (1) establish the basis for determining appropriate site specific cleanup levels in accordance with U.S. EPA guidance in the March 19, 1987 Federal Register, or (2) ascertain whether the background and nondetectable limits established by Ohio EPA could be met. This sampling needed to be completed prior to the initiation of excavation of the underground storage tanks to eliminate the possibility of having large excavation pits on-site during the time Ohio EPA and General Motors discussed appropriate clean-up limits. Ohio EPA advised General Motors to proceed with the sampling and, if different levels were appropriate, suggested that General Motors amend the closure plan.

In reliance upon Ohio EPA's suggested course of action, General Motors proceeded with the sampling. At a January 21, 1988 meeting General Motors received express approval of the conceptual basis for its site evaluation plan. On February 8, 1988, GM submitted a document entitled "Site Evaluation Plan" and began testing on February 29, 1988. On May 23, 1988, General Motors submitted the data resulting from the tests to the agency. Those results indicate that there is no contamination of subsoils in the vicinity of the underground storage tanks above background levels at the C-P-C Norwood facility.

Because the sampling results indicate that closure of the underground storage tanks pursuant to the unilateral OEPA modification can be achieved, GM is prepared to implement additional closure activities upon OEPA approval of the background levels identified in our May 23, 1988 correspondence. GM still believes, however, that the cleanup standards contained in the unilateral closure plan modification are not required by law.

The need for additional time to complete closure was an initial concern of General Motors. General Motors first raised this issue in the November 10, 1987 meeting and received assurances from Ohio EPA that sufficient extensions would likely be available to complete the sampling plan. Following the January 25, 1988 pre-hearing conference before the Environmental Board of Review, Tony Sasson again stated that Ohio EPA would be favorably inclined toward allowing General Motors an extension of the closure period in order to allow for the implementation of the Site Evaluation Plan. The sampling was necessary to avoid the risks to human health and the environment which could have arisen from a deep excavated pit being open for an extended period of time.

Accordingly, via this correspondence, General Motors requests an extension of 180 days from the date of approval of the background levels set forth in the May 20, 1988 submission to complete closure at the Norwood Plant. Once General Motors receives approval of the background levels, it can promptly begin additional closure activities.

General Motors does not believe that an extension of time to complete closure is an amendment necessitating public notice and comment. O.A.C. #3745-66-13 provides that the director may approve a longer closure period if General Motors demonstrates that the closure activities will, of necessity, take longer than six months and the corporation has taken steps to prevent threats to human health and the environment. General Motors has met that standard. If however, Ohio EPA's policy requires public notice and comment, then General Motors will abide by that procedure.

We hope that you will act promptly and favorably upon our request for the 180 day extension. GM would like to continue coordinating closure activities with your office in order to effectuate a proper closure. Should you or anyone from your staff have any questions, please call me at 513-631-2668.

Very truly yours,

W. H. Stanley

William H. Stanley

GWW/cmh
3500-85
CC: Anthony Sasson
Mike Savage
Joan Martin
Rebecca Strom
Richard Robertson

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

May 19, 1988

Scott R. Shane
Division of Solid and Hazardous Waste
Ohio EPA
S.W. District Office
7 East 4th Street
Dayton, Ohio 45402

RE: A Site Evaluation Plan; RCRA Closure Plan, General Motors Corp. CPC Group, Norwood Plant, OHDO04260089

Dear Mr. Shane:

General Motors Corporation, CPC Norwood, has been working with you over the course of the last few months in an effort to resolve the issues arising out of Ohio EPA's unilateral modification and approval of a Closure Plan for the underground storage tanks and drum storage area at our plant. As you know, the plant has been conducting extensive sampling for the purpose of determining the extent of contamination, if any, in the vicinity of the underground storage tanks in order to develop necessary for background information for closure implementation and, if necessary, establishment of appropriate clean-up when it's other than background levels. General Motors felt it necessary to implement this testing procedure in order to resolve issues with regard to appropriate clean-up levels prior to excavation of the underground storage tanks.

USEPA guidelines clearly provide for the establishment of clean-up other than background (see March 19, 1987 Federal Register). Since OEPA was unwilling to establish clean-up levels based on that USEPA guidance in the absence of data, General Motors concluded that preremoval testing was particularly appropriate with respect to the underground storage tanks. In the event some contamination of subsoils was discovered during closure, the excavated pits where the underground storage tanks had previously been located could provide a safety problem and could remain open for some extended period during the time needed for OEPA to resolve the clean-up level issue.

The pre-excavation sampling has now been completed. The results of that sampling and the significance of the sampling results for implementation of closure is addressed in the enclosed report.

A few points are worth highlighting. First, you'll note that the report includes the results of our on-site background sampling at the locations we have previously indicated and of which you were aware. The results of our initial testing also indicate that there has been no leakage of volatiles from these underground tanks. Furthermore, it appears that in the vicinity of the tanks the subsoils are at or below background levels. Accordingly, while we believe that less stringent clean-up limits can be substantiated and are warranted, on the basis of our background results, we now feel confident that we can implement the Ohio EPA approved Closure Plan with regard to the tanks without further modification. Our position on this issue would change in the event that during closure implementation we discover the presence of volatiles in the subsoils or in the event that we unexpectedly encounter metal levels in the subsoils which exceed our background.

With regard to the drum storage area, General Motors did not have the same site safety concerns and so, we have not conducted similar extensive testing in the vicinity of the existing drum storage pad. Once we mobilize for tank removal, we will also mobilize for closure of the drum storage area. In the event that we encounter volatiles at the drum storage area we will be approaching the agency to request adjusted clean-up limits in excess of the present "non-detectable" standard. The report outlines a methodology for establishing such alternative clean-up limits based upon known health risks from the ingestion of a specific contaminant. I would encourage you to familiarize yourself with the technique so that in the event that General Motors requests a modification of the present clean-up levels based upon field experience, you will be prepared to respond as quickly as possible.

Accordingly, CPC Norwood is now in a position to implement USEPA's approved Closure Plan for our underground storage tanks and drum storage area. The only remaining hurdle to our mobilization is your review, consideration and approval of the background data. As promptly as practical after having received written confirmation from you of your approval of the background levels, as reflected in the enclosed report, we will mobilize our contractors to implement closure. We look forward to hearing from you soon.

Very truly yours,

William H. Stanley

William H. Stanley

Enclosure
CC:
Tony Sasson (OEPA-Central Office)
Thomas Crepeau (OEPA-Central Office)
Rebecca Strom (US EPA Region V)
Paul D. Handcock (Ohio Attorney General)
Lenor L. Gaery-CPC Facilities
File

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

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Waste Management Division
U.S. EPA, REGION V

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JUN 1 1988
WMD-RCRA REGION V

Toward A Cleaner Environment
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Richard F. Celeste
Governor

May 27, 1988

Re: CLOSURE PLAN EXTENSION
GMC-CPC NORWOOD PLANT
OHD004260089, 05-31-0441

Mr. Douglas G. Haynam
Fuller & Henry
One Seagate, 17th Floor
P.O. Box 2088
Toledo, Ohio 43603

Dear Mr. Haynam:

This is to acknowledge the receipt of GMC's February 8, 1988, letter requesting an indefinite extension of time to complete the closure of a hazardous waste container storage area, four (4) underground hazardous waste storage tanks, an above ground hazardous waste storage tank and a quantity of hazardous wastewater treatment plant sludge located at 4726 Smith Road, Norwood, Ohio. This letter also responds to your letter of April 7, 1988, to Scott Shane, Ohio EPA, Southwest District Office (SWDO). An extension of time to complete closure of a hazardous waste facility is considered an amendment of the already approved closure plan. As such, this action would require the public notice of the proposed amendment, a thirty (30) day public comment period and the written approval of the Director of Ohio EPA.

It is the policy of Ohio EPA to specify in the public notice the length of additional time requested by GMC to complete closure. Be advised that an indefinite extension is an inappropriate request that will not be granted under any circumstances. Furthermore, preparation of an amended plan designed to supercede an approved closure plan which has not yet been executed may not be an acceptable reason for granting an extension to the closure period. If you believe that GMC has an acceptable reason(s) for not completing the closure by April 16, 1988, resubmit the extension request outlining GMC's justification and evidence for an extension along with a reasonable estimate of the additional time required to complete closure. To date, because GMC has not demonstrated that it could not close in accordance with the closure plan approval of October 19, 1987, Ohio EPA would expect this activity to have proceeded as approved. In fact, the data contained in GMC's May 23, 1988, submission to Ohio EPA indicates that a clean closure was achievable.

If you have any questions, please contact Anthony Sasson at (614)644-2956.

Sincerely,

Richard L. Shank

Richard L. Shank, Ph.D.
Director

RLS/RM/ara

cc: Herb Stone, GMC
Mike Savage, DSHWM, Ohio EPA
Anthony Sasson, DSHWM, Ohio EPA
Dick Robertson, SWDO, Ohio EPA
Paul Hancock, Ohio AGO
Rebecca Strom, USEPA, Region V
Joan DeMartin, Legal, Ohio EPA

1565U

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

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FEB 11 1988
U. S. EPA, REGION V
SWB — PMS

February 8, 1988

Scott R. Shane
Division of Solid and Hazardous Waste
Ohio Environmental Protection Agency
S.W. District Office
7 East 4th Street
Dayton, OH 45402

RE: A Site Evaluation Plan; RCRA Closure Plan, General Motors Corporation, C.P.C. Group, Norwood Plant, OHD004260089

Dear Mr. Shane,

Enclosed is the sampling report entitled "Site Evaluation Plan", from our contractor (ATEC Environmental Services) which we discussed when we met on January 21, 1988. The report sets forth the procedures ATEC will follow in developing additional data necessary to establish appropriate cleanup levels for closure of the hazardous waste management units at the Norwood Plant. General Motors anticipates initiating the site evaluation on or about February 29, 1988. Accordingly, I would appreciate any comments which you or others at OEPA may have on the enclosed document on or before the close of business on February 15, 1988.

On October 19, 1987, Ohio EPA approved a closure plan which differed significantly from the plan originally submitted by General Motors. General Motors greatest concern was that the Agency unilaterally modified the cleanup limits for closure. On November 10, 1987, representatives from General Motors met with you and others from Ohio EPA to discuss our concerns with the modified closure plan approved. At that time we requested that the Agency's approval be withdrawn. OEPA indicated that rather than withdrawing the approval, a closure plan amendment would be the appropriate means of securing a modification of the cleanup limits.

Pursuant to that guidance, General Motors advised you that it would seek an amendment to the closure plan. The enclosed "Site Evaluation Plan" sets forth the sampling protocols which ATEC will follow in developing the necessary data to support appropriate cleanup limits for closure. In developing this plan, ATEC relied upon the guidance provided by U.S. EPA in its Federal Register notice of March 19, 1987 (52 Fed. Reg. 8704, 8706) regarding appropriate closure cleanup limits.

COPY

Based on the schedule in the enclosed plan, General Motors anticipates filing an amended closure plan with alternative cleanup limits in late April. While we have moved promptly to prepare the enclosed plan and intend to complete the necessary sampling and analysis as expeditiously as possible, General Motors will not be able to complete closure of the regulated units within one hundred and eighty (180) days of the October 19 approval. The General Motors' closure activities will, of necessity, take longer than six (6) months to complete, and General Motors has taken all steps to prevent any threat to human health and the environment from the unclosed but inactive RCRA units. In accordance with O.A.C. §3745-66-13, General Motors requests that Ohio EPA extend the one hundred and eighty (180) day closure period indefinitely pending approval of the closure plan amendment. Furthermore, by copy of this letter to Rebecca Strom (Region V), we are also requesting that USEPA grant a similar extension.

General Motors hopes to close the hazardous waste units at its Norwood Plant in accordance with appropriate cleanup levels. We look forward to receiving your comments on the enclosed site evaluation plan. In addition, please contact us soon as possible regarding our request for an extension of the closure period.

Very truly yours,

W. H. Stanley

William H. Stanley

WHS/ld
Enclosure
cc:
Tony Sasson(OEPA-Central Office)
Thomas Crepeau(OEPA-Central File)
Rebecca Strom(US EPA Region V)
Paul D. Handcock(Ohio Attorney General)
Lenor L. Gaery-CPC Facilities
File

R. Stkom

FULLER & HENRY
ATTORNEYS AT LAW
1200 EDISON PLAZA
P. O. BOX 2088
TOLEDO, OHIO 43603
(419) 255-8220
TELECOPIER (419) 241-1544

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SOLID WASTE BRANCH
U.S. EPA, REGION V

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U. S. EPA, REGION V
SWB — PMS

October 30, 1987

Mr. Edward Kitchen
Division of Solid
and Hazardous Waste
P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43265-0149

Re: Closure Plan
General Motors Corporation
C-P-C Group, Norwood Plant
OHDOD4260080/05-31-0441

Dear Mr. Kitchen:

Confirming our conversation of earlier this week, I understand that paragraph 4 of Director Shank's letter of October 19, 1987 to Herb Stone setting forth Ohio EPA's conditional approval of the above-referenced closure plan contains an error. That paragraph mistakenly requires the C-P-C Norwood Plant to submit certain metals analyses "within ten working days of the date of this letter." You have advised me that this paragraph was intended to require that the C-P-C Norwood Plant submit the specified metal analyses within ten days of receiving the results from the sampling procedures described in paragraph 4. It is our understanding, and yours, that these analyses will not be available until some unspecified time in the future, after U.S. EPA approve the closure plan and closure work begins at the plant.

I have advised C-P-C and Norwood Plant personnel of this correction to Director Shank's letter. As we discussed on the phone, General Motors has additional concerns regarding the modifications set forth in that letter and we look forward to meeting with you in the near future to address those concerns. I will be contacting you early next week to schedule a meeting to address those concerns. In any case, unless we are advised otherwise we will consider that paragraph 4 of the closure approval letter will be interpreted by Ohio EPA in accordance with our conversation as set forth above.

Very truly yours,

Douglas G. Haynam

Douglas G. Haynam

DGH/dal
cc: Thomas Crepeau/DSHWM Central File, Ohio EPA
Rebecca Strom, USEPA, Region V
Scott Shane, SWDO, Ohio EPA
William Stanley, Norwood Plant
Patrick S. McCarroll, Esq.

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

Toward A Cleaner Environment
15 Year Anniversary 1972 - 1987

Richard F. Celeste
Governor

CERTIFIED MAIL

October 19, 1987

Re: CLOSURE PLAN
GENERAL MOTORS CORPORATION
C-P-C GROUP, NORWOOD PLANT
OHD004260089/05-31-0441

Mr. Herb D. Stone, Plant Manager
General Motors Corporation
C-P-C Group, Norwood Plant
P.O. Box 12171
Norwood, Ohio 45212

Dear Mr. Stone:

On May 11, 1987, the General Motors Corp., C-P-C Group, Norwood Plant (GMC) submitted to Ohio EPA a closure plan for a hazardous waste container (barrel) storage area, four (4) underground hazardous waste storage tanks, one (1) above ground hazardous waste storage tank, and a quantity of hazardous wastewater treatment plant sludge. The facilities are located at 4726 Smith Road, Norwood, Ohio. Revisions to the closure plan were received on August 5, 1987. The closure plan was submitted pursuant to Rule 3745-66-12 of the Ohio Administrative Code (OAC) in order to demonstrate that GMC's proposal for closure complies with the requirements of OAC Rules 3745-66-11 and 3745-66-12.

The public was given the opportunity to submit written comments regarding the closure plan of GMC in accordance with OAC Rule 3745-66-12. No comments were received by Ohio EPA in this matter.

Based upon review of the company's submittal, subsequent revisions and attached modifications, I conclude that with the following modifications the closure plan for the hazardous waste facility at GMC meets the performance standard contained in OAC Rule 3745-66-11 and complies with the pertinent parts of OAC Rule 3745-66-12.

The closure plan submitted to Ohio EPA by GMC is hereby approved with the following modifications:

1. Wash waters and/or rinseates from all hazardous waste management areas shall be considered contaminated if they contain greater than 1 mg/l of any RCRA regulated waste solvent. Contaminated wash waters and/or rinseates shall be managed as hazardous waste. Cleaning of contaminated surfaces shall continue until the above 1 mg/l criterion is met.

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency.

By Mary Carr Date 10-19-87

Ohio Environmental Protection Agency
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OCT 19 1987

2. Visual observations alone shall not be sufficient to determine if contamination exists.

3. Soil samples and soils shall be considered contaminated if they contain any RCRA regulated waste solvent at greater than that material's analytical detection limit. Detection limits and analytical methods shall be taken from USEPA Publication SW-846, "Test Methods for Evaluating Solid Waste."

4. GMC shall select from the attached a means by which background and closure soil samples shall be compared to determine if soils in the excavated areas are significantly contaminated with barium, cadmium, chromium, or lead. All metals analyses shall be for total metals. This material shall be submitted to Ohio EPA Central Office (CO) and Southwest District Office (SWDO) within ten (10) working days of the date of this letter.

5. Background levels of naturally occurring elements shall be determined by collecting at least four (4) soil samples in the same soil type and at the same depth as the soil samples to be taken elsewhere for closure purposes. The location of the background sampling sites shall be submitted to Ohio EPA CO and SWDO within thirty (30) days of the date of this letter. The sampling locations shall be indicated on a site map to be submitted with the above information.

6. At least four (4) soil sample locations shall be used to collect soil samples from each tank bed of the underground hazardous waste storage tanks. One sample shall be taken from the floor of the area. At each location, soil samples shall be taken at six (6) inch intervals to a depth of eighteen (18) inches. The soil samples shall be analyzed for the total metals indicated above and all RCRA regulated waste solvents stored in the underground hazardous waste storage tanks. Samples shall be analyzed individually and not composited. The soil samples shall be taken after each tank is removed.

7. If the above soil samples indicate the soil below and around the underground storage tanks is contaminated, soil shall be removed until contamination is no longer encountered. Soil samples shall be collected to show that contamination no longer exists in the underground storage tank beds.

8. The area below the above ground storage tanks shall be ~~sampled with~~ tested for hazardous waste contamination using water rinseate. The rinseate shall be analyzed for all RCRA regulated waste solvents along with EP Toxicity barium, cadmium, chromium, and lead (OAC 3745-51-24). If the rinseate contains greater than 1 mg/l of any of the RCRA regulated waste solvents stored there or contains the metals above

in concentrations greater than the maximum concentrations of contaminants for characteristic of EP toxicity (DAC 3745-51-24), the area shall be cleaned until the above criteria can be met. Contaminated rinseates or wash waters shall be managed as hazardous waste.

9. At least three (3) locations shall be sampled beneath the container (barrel) storage area. Samples shall be collected at six (6) inch intervals to a depth of at least eighteen (18) inches and shall be analyzed using Method 8240 as found in USEPA Publication SW-846, "Test Methods for Evaluating Solid Wastes." Samples shall also be analyzed for total barium, total cadmium, total chromium, and total lead for comparison to background soil sample results. Soils containing RCRA regulated organic compounds at greater than the compound's analytical detection limit shall be considered contaminated and managed as hazardous waste. Soil removal and sampling shall continue until the above criteria are met. If further soil sampling is required to determine the extent of contamination, a remediation plan shall be submitted to Ohio EPA SWDD and CD.

10. Prior to sampling, GMC shall submit to Ohio EPA CO and SWDO a detailed description of sampling methods, sampling equipment and sample locations. Sample locations shall be marked on site maps or diagrams of the hazardous waste management units.

Please be advised that approval of this closure plan does not release GMC from any responsibilities as required under the Hazardous and Solid Waste Amendments of 1984 regarding corrective action for all releases of hazardous waste or constituents from any solid waste management unit, regardless of the time at which waste was placed in the unit.

Due to the fact that the Ohio EPA is not currently authorized to conduct the federal hazardous waste program in Ohio, your closure plan also must be reviewed and approved by USEPA. Federal RCRA closure regulations (40 CFR 265.112) require that you submit a closure plan to George Hamper, Chief, Waste Management Division, Technical Programs Section, Ohio Unit, USEPA, Region V, 5HS-13, 230 South Dearborn Street, Chicago, Illinois 60604. Approval by both agencies is necessary prior to commencement of activities required by the approved closure plan.

You are notified that this action of the Director is final and may be appealed to the Environmental Board of Review pursuant to Section 3745.04 of the Ohio Revised Code. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. It must be filed with the Environmental Board of Review within thirty (30) days after notice of the Director's action. A copy of the appeal must be served on the Director of the Ohio Environmental Protection Agency and the Environmental

Enforcement Section of the Office of the Attorney General within three (3) days of filing with the Board. An appeal may be filed with the Environmental Board of Review at the following address: Environmental Board of Review, 236 East Town Street, Room 300, Columbus, Ohio 43266-0557.

When closure is completed, the Ohio Administrative Code Rule 3745-66-15 requires the owner or operator of a facility to submit to the Director of the Ohio EPA certification by the owner or operator and a registered professional engineer that the facility has been closed in accordance with the approved closure plan. The certification by the owner or operator shall include the statement found in OAC 3745-50-42(D). These certifications should be submitted to: Ohio Environmental Protection Agency, Division of Solid and Hazardous Waste Management, Attn: Thomas Crepeau, Program Planning and Management Section, P.O. Box 1049, Columbus, Ohio 43266-0149.

Sincerely,

Richard L. Shank, Ph.D.
Director

RLS/DF/ara

Attachment

cc: Thomas Crepeau/DSHWM Central File, Ohio EPA
Rebecca Strom, USEPA, Region V
Scott Shane, SWDO, Ohio EPA

1370U

Ohio Environmental Protection Agency
ENTERED DIRECTOR'S JOURNAL
OCT 19 1987

I certify this to be a true and accurate copy of the official document as filed in the records of the Ohio Environmental Protection Agency.

By: Mary Cavin Date 10-19-87

ATTACHMENT

NATURALLY OCCURRING ELEMENTS OR COMPOUNDS

Alternative A - Soils containing naturally occurring elements in the area of the hazardous waste management unit shall be considered to be contaminated if concentrations in the soils exceed the mean of the background samples plus two standard deviations.

All metals analyses must be for total metals.

Alternative B - Soils containing RCRA-regulated metals shall be considered to be contaminated if concentrations in the soil exceed the upper limit of the range for Ohio farm soils, as given below:

Metal	Range (Total Metal Concentration in ug/g)
Cadmium	0 - 2.9
Chromium	4 - 23
Lead	9 - 39

(Source: Logan, T.J. and R.H. Miller, 1983. Background Levels of Heavy Metals in Ohio Farm Soils. Research Circular 275, Ohio State University, Ohio Agricultural Research and Development Center, Wooster.)

All metals analyses must be for total metals.

Ohio EPA may reject any of the above alternatives based on site-specific information. Also, the Agency may accept alternate statistical methods if the owner/operator can demonstrate that the statistical method proposed is environmentally acceptable and is technically superior.

1370U

OhioEPA

State of Ohio Environmental Protection Agency

P.O. Box 1049, 1800 WaterMark Dr.
Columbus, Ohio 43266-0149

Toward A Cleaner Environment
15 Year Anniversary 1972 - 1987

Richard F. Celeste
Governor

August 27, 1987

Re: GMC/Norwood
Closure Plan
US EPA ID No.: OHD004260089
Ohio Permit No.: 05-31-0441

GMC/Norwood
Attn: Herbert D. Stone
4726 Smith Road
Norwood, Ohio 45212

Dear Sir:

A public notice acknowledging the Ohio EPA's receipt of a closure plan for GMC/Norwood in Norwood, Ohio will appear the week of August 24, 1987, in the Cincinnati Enquirer, Cincinnati, Ohio. The Director of the Ohio EPA will act upon the closure plan request following the close of the public comment period, September 30, 1987.

Copies of the closure plan will be available for public review at the Public Library of Cincinnati and Hamilton County, 800 Vine Street, Cincinnati, Ohio 45202 and the Ohio EPA, Southwest District Office, 7 East Fourth Street, Dayton, Ohio 45402.

Please contact me at (614) 481-7217, if you have any questions concerning this matter.

Sincerely,

Thomas E. Crepeau

Thomas E. Crepeau
Program Planning and Management Section
Division of Solid & Hazardous Waste Management

TEC/dhs

cc: Rebecca Strom, U.S. EPA, Region V, w/o attachment
Dan Fisher, Ohio EPA, DSHWM, TA&ES
Scott Shane, Ohio EPA, DSHWM, SWDO

1013R

PUBLIC NOTICE Hamilton County

RECEIPT OF HAZARDOUS WASTE CLOSURE PLAN

For: GMC/Norwood, U.S. EPA ID No.: OHD004260089, Ohio Permit No.: 05-31-0441, 4726 Smith Road, Norwood, Ohio 45212. Pursuant to OAC Rule 3745-66-10 thru 17 and 40 CFR, Subpart G, 265.110 thru 117, the Ohio Environmental Protection Agency (Ohio EPA) is hereby giving notice of the receipt of a Hazardous Waste Facility Closure Plan for the above referenced facility. Ohio EPA is also giving notice that this facility is subject to a determination concerning corrective action, a requirement under the Hazardous and Solid Waste Amendments of 1984, which concerns any possible uncorrected releases of hazardous waste or hazardous constituents to the environment from any current or previous solid waste management units at the above facility. A corrective action determination is required from hazardous waste facilities intending to close.

Copies of the facility's Closure Plan will be available for public review at the Public Library of Cincinnati and Hamilton County, 800 Vine Street, Cincinnati, Ohio 45202 and the Ohio EPA, Southwest District Office, 7 E. Fourth Street, Dayton, Ohio 45402.

Comments concerning the Closure Plan or factual information concerning any releases of hazardous waste or hazardous waste constituents by the above facility requiring corrective action should be submitted within 30 days of this notice to: Ohio Environmental Protection Agency, Div. of Solid & Hazardous Waste Mgmt., Program Planning and Management Section, Attn: Thomas E. Crepeau, Box 1049, Columbus, Ohio 43266-0149.

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

July 23,1987

Mr. Tom Crepeau
Director of Ohio EPA
361 East Broad Street
Columbus, Ohio 43216

Dear Mr. Crepeau:

As per the requirements of the Ohio code (3745-55-12 para.C) we have enclosed three copies of C.P.C. Norwoods revised closure plan.

The closure plan has been revised to incorporate the changes proposed by the Ohio EPA's letter dated May 28,1987.

Should you have any questions in regard to the closure plan please contact Mr. William H. Stanley at 513-841-5102.

Sincerely,

Herb Stone

Herb D. Stone
Plant Manager

WHS/ld
cc:
Dir. of Waste Mgt. Div.
USEPA Region V
Scott Shane Ohio EPA
S.W. District Office
File

RECEIVED
MAY 12 1987
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
OFFICE OF THE DIRECTOR

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

May 5, 1987

Mr. Tom Crepeau
Director of Ohio EPA
361 East Broad Street
Columbus Ohio 43216

OHD 004 260 089

Dear Mr. Crepeau:

General Motors Corporation will cease production operations at the Norwood Plant on August 26, 1987. The months of September and October are scheduled for equipment removal and general plant cleaning. The tentative closing of the plant is October 31, 1987.

The RCRA regulated facilities at Norwood will be closed in accordance with the closure plan. As required by the Ohio code (3745-55-12 Para C) we are submitting the enclosed closure plan. The intent is to remove all hazardous waste from RCRA units and eliminate the need for a post closure plan.

Should you have any questions in regard to the closure plan please contact Mr. William Stanley at 513-841-5102

Herbert D. Stone
Herbert D. Stone
Plant Manager

WHS/ld
cc:
Dir. of Waste Mgt. Div.
USEPA Region V
Scott Shane-Ohio EPA
S.W. District Office
File

RECEIVED
JUN 30 1987
SOLID WASTE BRANCH
U.S. EPA, REGION V

RCRA HAZARDOUS WASTE MANAGEMENT FACILITY CLOSURE PLAN

1. Introduction:

Under the U.S. EPA regulations, 40 CFR Part 265, Subpart G. Sections 265.110 thru 265.120, each facility which stores, treats, or disposes of hazardous wastes must have a Closure Plan on file. This Closure Plan has been prepared to cover the following facility:

a. Facility Location: General Motors Corporation
C-P-C Group Norwood Plant
4726 Smith Road
Norwood, Ohio 45212

b. Identification Number EPA No. OHD004260089
Ohio Permit No. 05-31-0441

c. This Plan has been prepared by:
Mark A. Endres, Plant Engineer
Date: 5-18-81

d. This Plan has been revised by:
M.A. Endres, 3-21-83
W.H. Stanley, 4-16-87

e. RCRA permitted hazardous waste storage and treatment facility at G.M. Plant, Norwood, Ohio. The areas of the Norwood Plant that are permitted under RCRA as hazardous waste storage or treatment facilities along with the type of waste handled are listed on the following page. This list does not include all areas that may cause possible hazards to human health or the environment but only those areas that store or treat hazardous waste.

AREA	LOCATION	MATERIAL	EPA HAZARD	DOT HAZARD
Hazardous Waste Storage	Drum Storage South yard	Spent Paint Thinner	D001	Flammable
		Spent Chlotinated Solvent	F001	Flammable
		Waste Adhesive	D001	Flammable
		Chromium Sludge	D007	
		Waste Solder	D008	
Underground Storage Tanks	South yard	Spent Paint Thinner	D001	Flammable
		Spent Chlotinated Solvent	F001	Flammable
	Paint Trap	Spent Paint	D001	Flammable
	North Fire Lane	Spent Paint Thinner	D001	Flammable
Aboveground Storage Tank	Red Label Room	Spent Paint Thinner	D001	Flammable
Wastewater Treatment	Wastewater Treatment Plant	Wastewater Treatment Sludge	F006	

2. Maximum Waste Inventory:

The following table shows the maximum quantity of wastes for a given area:

a. Barrel Storage area:

Spent paint thinner	100 drums
Spent chlorinated solvent	50 drums
Waste adhesive	20 drums
* Chromium sludge	0 drums
* Waste solder	0 drums

b. Underground Storage Tanks

Spent paint thinner	12000 gallons
Spent paint thinner	6000 gallons
Chlorinated solvent tank	6000 gallons
Waste Paint	2000 gallons

c. Aboveground Storage Tank

Spent paint thinner	4100 gallons

e. Waste water treatment system

Waste water treatment sludge	50 tons

* Quantities were reduced by technological improvments.

3. Schedule For Closure:

The waste storage areas located within this facility are directly related to the production activities of this plant. The closure of the RCRA regulated facilities will occur after production operations are discontinued August 26, 1987.

Therefore, for compliance with the Hazardous Waste Regulations, the year of closure is 1987. The date closure of the RCRA facilities will commence is November 1, 1987. This plan will be submitted to the Director of the Ohio EPA at least 180 days before the closure is to begin (3745-55-12 para.C).

The following schedule is the time table for closure in accordance to (3745-55-12 para A4).

November 1, 1987	Plant termination of hazardous waste activity
November 5, 1987	Arrangements with approved Hazardous Waste Transporters and Disposal Sites.
November 20, 1987	Remove all drum material to approved disposal facility.
November 25, 1987	Contents of all RCRA tanks removed and shipped to approved disposal facility
December 30, 1987	Remove under storage tanks.
January 5, 1988	Sample soil area around tanks. Test barrel storage area for contamination.
January 20, 1988	Backfill tank area.
January 25, 1988	Closure complete.
January 30, 1988	Certification of RCRA closure by independent registered professional engineer.

4. Decontamination of Facility and Disposal of tanks:

a. Above ground waste solvent tank in red label room
Remove waste solvent from tank.
Check tank atmosphere render inert if required.
Remove tank from red label room.
Open tank.
Solidify sludge using a fixing agent.
Dispose of sludge at EPA approved facility.
High pressure water wash to remove residue.
Treat and dispose of wastewater.
Cut up steel and scrap.
High pressure water wash containment area in the red label room.
Treat and dispose of wastewater.
Take wipe samples to determine residue has been removed
Test samples for EP toxicity.
Repeat High pressure water wash as required.

b. Above ground portable waste solvent tank .
Remove waste solvent from tank.
Check tank atmosphere render inert if required.
Open the tank.
Solidify sludge using a fixing agent.
Dispose of sludge at EPA approved facility.
High pressure water wash to remove residue.
Treat and dispose of wastewater.
Cut up steel and scrap.

c. Underground storage tanks
Remove waste solvent from tank.
Check tank atmosphere render inert if required.
Remove concrete from around filler neck.
Visually inspect soil at filler neck for contamination
Sample air around filler neck using organic vapor

analyzer
If no vapor is detected at filler neck soil will be used for backfill.
If vapor is detected soil will be analyzed to determine characteristics and contaminated soil disposed of at EPA approved facility.
Remove tank from the ground.
Open the tanks.
Solidify sludge using a fixing agent.
Dispose of sludge at EPA approved facility.
High pressure water wash to remove residue.
Treat and dispose of wastewater.
Cut up steel and scrap.
Visually inspect soil area below tank for contamination
Sample air in tank pit using organic vapor analyzer
If no vapor is detected in the pit. Pit will be backfill.
If vapor is detected soil will be analyzed to determine characteristics and contaminated soil will be removed and disposed of at EPA approved facility.

d. Hazardous Waste Storage Area:
Scrape to remove solid material and sludge from storage area and sump pit.
Solidify sludge using a fixing agent.
Dispose of sludge at EPA approved facility.
High pressure water wash to remove residue.
Treat and dispose of wastewater.
Take wipe samples to determine residue has been removed
Test samples for EP toxicity.
Repeat High pressure water wash as required.

5. Cost Estimate For Closure:

Estimated cost of closure for G.M. Norwood RCRA facility is $241,700.

6. Closure Certification:

An independent registered professional engineer will be engaged by General Motors Corporation to verify the closure activities and certify the RCRA facilities have been closed in accordance with this closure plan.

A representative of General Motors will act as the owner.

6 JAN 1988

5H-12

Herb D. Stone
Plant Manager
General Motors Corporation
C-P-C Group, Norwood Plant
Post Office Box 12171
Norwood, Ohio 45212

RE: Closure Plan
General Motors Corporation
C-P-C Group, Norwood Plant
OHD 004260089

Dear Mr. Stone:

The United States Environmental Protection Agency (U.S. EPA) received a copy of the above-referenced facility's closure plan on June 30, 1987. This plan was submitted to the Ohio Environmental Protection Agency (OEPA) on May 11, 1987. The plan concerned the closure of a hazardous waste container storage area, four underground hazardous waste storage tanks, one above ground hazardous waste storage tank, and a quantity of hazardous wastewater treatment sludge located at the facility.

The public was given the opportunity to submit written comments regarding the closure plan of GMC in accordance with 40 CFR §265.112. No comments were received by OEPA in this matter.

The OEPA approved the plan conditionally in a letter dated October 19, 1987. The U.S. EPA concurs with the OEPA's review and approval. U.S. EPA approves the closure plan submitted by General Motors Corporation, with the conditions stipulated in the October 19, 1987, letter.

If you have any further questions, please contact Ms. Rebecca Strom of my staff, at (312) 886-6194.

Sincerely,

Basil G. Constantelos, Director
Waste Management Division

cc: Scott Shane, OEPA-SWDO
Tony Sasson, OEPA
Tom Crepeau, OEPA
Randy Meyer, OEPA

bcc: File

5HS/Strom:vw 12/29/87 Disk #3

au 12-31-87

	TYP.	AUTH.	IL. CHIEF	IN. CHIEF	MI. CHIEF	MN/WI CHIEF	OH. CHIEF	TPS CHIEF	SWB CHIEF	WMD DIR.
INIT. DATE	VW 12/30	RLS 12/31					GH 12/31/87	[illegible] 12/31/87	[illegible] 1/4/88	[illegible] 1/5/88

EP 1-4-88

A.4.2

ATEC® Environmental Services

A Division of Atec Associates, Inc.

Environmental Engineering and Analytical Services

JANUARY 28, 1988 FINAL REPORT
SITE EVALUATION PLAN
RCRA CLOSURE PLAN
GM-CPC NORWOOD PLANT
NORWOOD, OHIO
ATEC PROJECT NUMBER 21-73223

Prepared For:

GENERAL MOTORS CORPORATION
CHEVROLET-PONTIAC CANADA GROUP
P.O. BOX 12171
NORWOOD, OH 45212

ATEC Environmental Services
A Division of ATEC Associates, Inc.
5150 East 65th Street
Indianapolis, Indiana 46220-4871
(317) 849-4990, Telex 221-500 ASAS

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

January 28, 1988

Mr. Bill Stanley
General Motors Corporation
Chevrolet-Pontiac Canada Group
P.O. Box 12171
Norwood, OH 45212

Re: January 28, 1988 Final Report
Site Evaluation Plan
RCRA Closure Plan
GM-CPC Norwood Plant
Norwood, Ohio
ATEC Project Number 21-73223

Dear Mr. Stanley:

Enclosed please find our final report of the above-referenced project. We trust this submittal meets with your approval. Please feel free to contact us if you have any questions or comments.

Very truly yours,

ATEC Associates, Inc.

Daniel Pratter

Daniel Pratter
Hydrogeologist

Geoffrey A. Glanders

Geoffrey A. Glanders
Project Hydrogeologist

COPY

ATEC ASSOCIATES INC. 30th ANNIVERSARY THANKS TO YOU

TABLE OF CONTENTS

JANUARY 28, 1988 FINAL REPORT

Site Evaluation Plan
GM-CPC Norwood Plant
Norwood, Ohio
ATEC Project Number 21-73223

1.0 INTRODUCTION

General Motors Corporation (GM) is ceasing operations at its Norwood Plant in Norwood, Ohio. One component of this cessation involves closure of the hazardous waste management units at the plant. GM submitted a revised closure plan to the Ohio Environmental Protection Agency (OEPA) describing the methods for closure of these units on July 23, 1987. The OEPA responded by issuing a final approved closure plan which included some modifications. One of the major modifications of concern to GM involves OEPA's interpretation of the closure requirement to remove all waste residues from the tanks and drum storage pads which are the subject of the closure plan and the establishment of acceptable levels for evaluating when that removal is complete. The OEPA has defined contaminated soil as any soil which contains hazardous waste or hazardous waste constituents in concentrations greater than background or detectable levels. The OEPA modification further requires that all contaminated soil be removed at closure.

With regard to the requirement that GM remove all hazardous waste and hazardous waste residues at the time of closure of its hazardous waste management units (the tanks and drum storage pad), U.S. EPA has interpreted this requirement to mandate removal of those materials which "pose a substantial present or potential threat to human health or the environment". The federal agency discussed this requirement at length in a Federal Register notice last March (52 Fed. Reg. 8704, at 8706 [March 19, 1987]). U.S. EPA expressly noted that following closure limited quantities of hazardous constituents might remain in the subsoil and yet present only minimal risks to human health and the environment. The Agency further established a procedure for reviewing site specific demonstrations submitted by facility owners designed to document appropriate decontamination levels.

The purpose of this document is to set forth the procedures GM will follow to develop the necessary data to support a demonstration of appropriate decontamination levels at the facilities to be closed at its Norwood Plant. The following plan describes the procedures proposed by GM to evaluate the presence of contamination at these units and, if present, to establish decontamination levels which are appropriate for the site conditions, in accordance with the criteria established by U.S. EPA in the March 19, 1987 Federal Register. GM intends to perform this demonstration prior to removal of the RCRA underground storage tanks. By evaluating the presence of contamination at these units and establishing decontamination levels prior to excavation, GM intends to prevent the obvious safety and environmental hazards which would arise by leaving an excavation open while these evaluations are being performed.

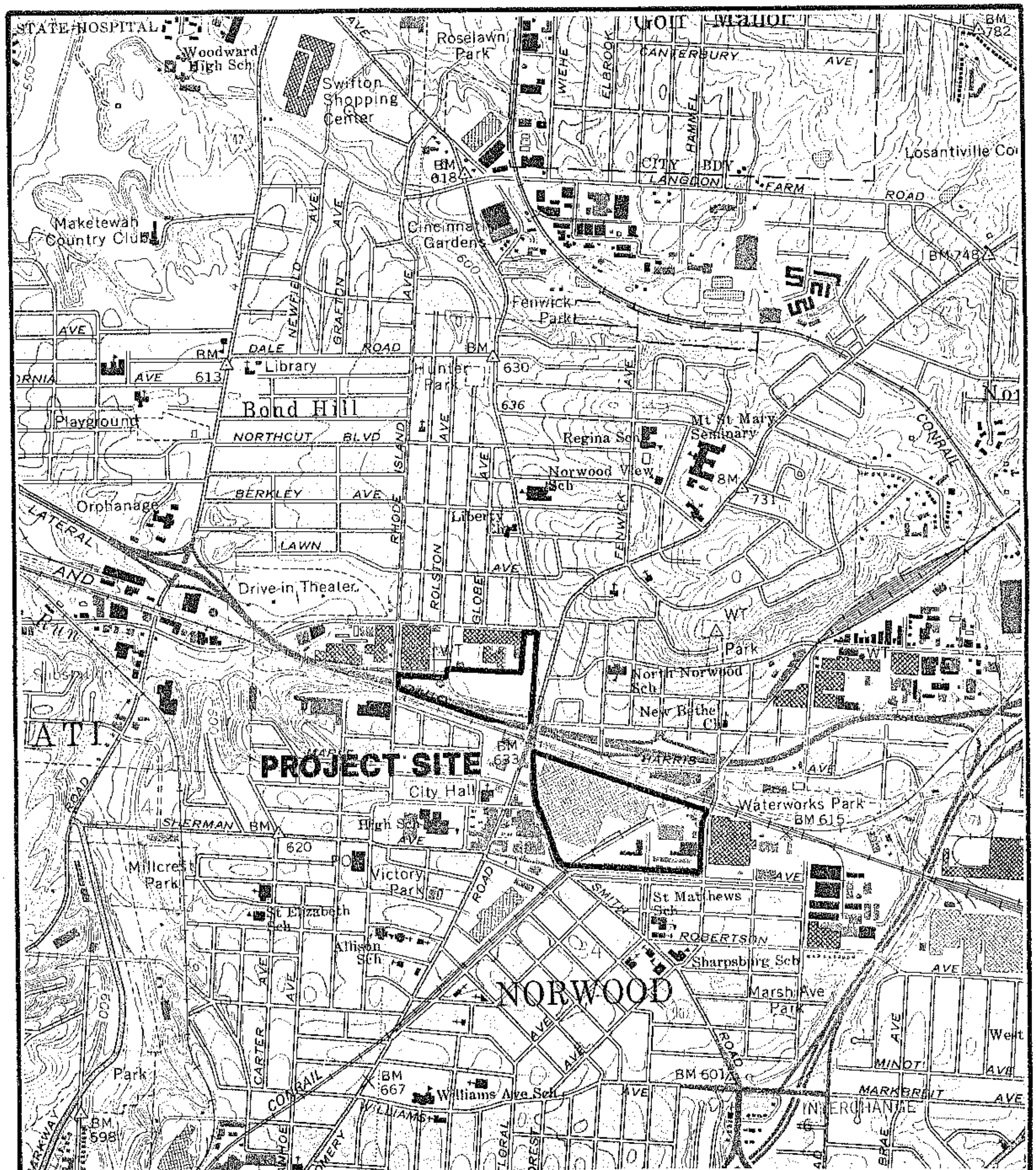
2.0 BACKGROUND INFORMATION

The study area is located in the southwestern Ohio City of Norwood as shown in Figure 1. The Norwood Plant was designed and constructed as an assembly facility in 1922. The original structure contained 270,334 square feet of manufacturing space. Throughout the following sixty-five years of operation numerous expansions of the plant occurred. As of 1987, the total manufacturing space equals 3,200,000 square feet. In addition to the Assembly Building, various other buildings are situated on the 59.1 acre property. These structures include the Powerhouse, Utility Building, Vaporizer Blend House, Emission Building, Waste Treatment Building and Pump House.

Four different major production departments were incorporated in the automobile assembly process. The Body Department assembled sheet metal parts into the basic automobile body. The Paint Department prepared, painted and sealed the automobile body. The Trim Department assembled wiring, glass, carpet, seats, doors and quarter-panels. The Chassis Department assembled drive items such as axles, springs, transmissions, engines and suspension equipment to the automobile body.

2.1 History of Operations

The first Chevrolet rolled off the assembly line on August 13, 1923. A major plant expansion and modernization program in 1970 resulted in production of a second generation of Camaros and Firebirds at Norwood. Prior to production of the



VICINITY MAP NORWOOD PLANT GENERAL MOTORS - CHEVROLET PONTIAC CANADA GROUP NORWOOD, OHIO	PROJECT NO. 21-73223 SCALE 1" = 2000' FIGURE NO. 1	ATEC

1982 models, the Norwood Plant underwent the most extensive facility change in the Plant's history. This 606,857 square foot addition to the facility initiated the third generation of automobiles produced at Norwood. On August 26, 1987 the last Chevrolet Camaro and Pontiac Firebird rolled off the assembly lines.

2.2 Assembly Plant Property

The original Assembly Plant occupied the western third of the plant site. Prior to expansion of the original Assembly Plant, the adjacent property to the east consisted of a field used primarily for recreational purposes. Over the years small manufacturing facilities developed on the perimeter of this property which were bought and the structures demolished as the Assembly Plant expanded. No environmental studies of these properties were performed by GM prior to acquisition. The possibility, therefore, exists that operations by previous owners may have impacted soils and groundwater in these areas.

The Heekin Can Company maintained a tin can manufacturing operation on the southeastern corner of the present site between Floral and Forest Avenues which was purchased and demolished by GM in 1960. Mendel Drucker Inc. was located on the northeast corner of what is now the Assembly Building. Reportedly Mendel Drucker manufactured leather products and this property was bought by GM in 1964 and the structure razed in 1965. Allis Chalmers Company produced large industrial electrical motors on Floral Avenue at the location which is now the Utility Building. GM purchased the property in 1967 and demolished the Allis Chalmers structure in 1968. The present barrel storage area at the southwest corner of the Assembly Plant property was once owned by the Sterling Electric Company. This company reportedly repaired electric motors and was purchased by GM in 1978 and the building was demolished in 1979.

A topographic low or ravine once traversed part of the Assembly Plant property from the northeast to the southwest corners of the site. The ravine is no longer apparent at the land surface and is presently occupied by a 66 in. sewer line. The sewer line was installed in 1923 by the City of Norwood and is presently under the control of the Metropolitan Sewer District of Cincinnati. The ravine also reportedly was filled with mixed fill in conjunction with the installation of the sewer line.

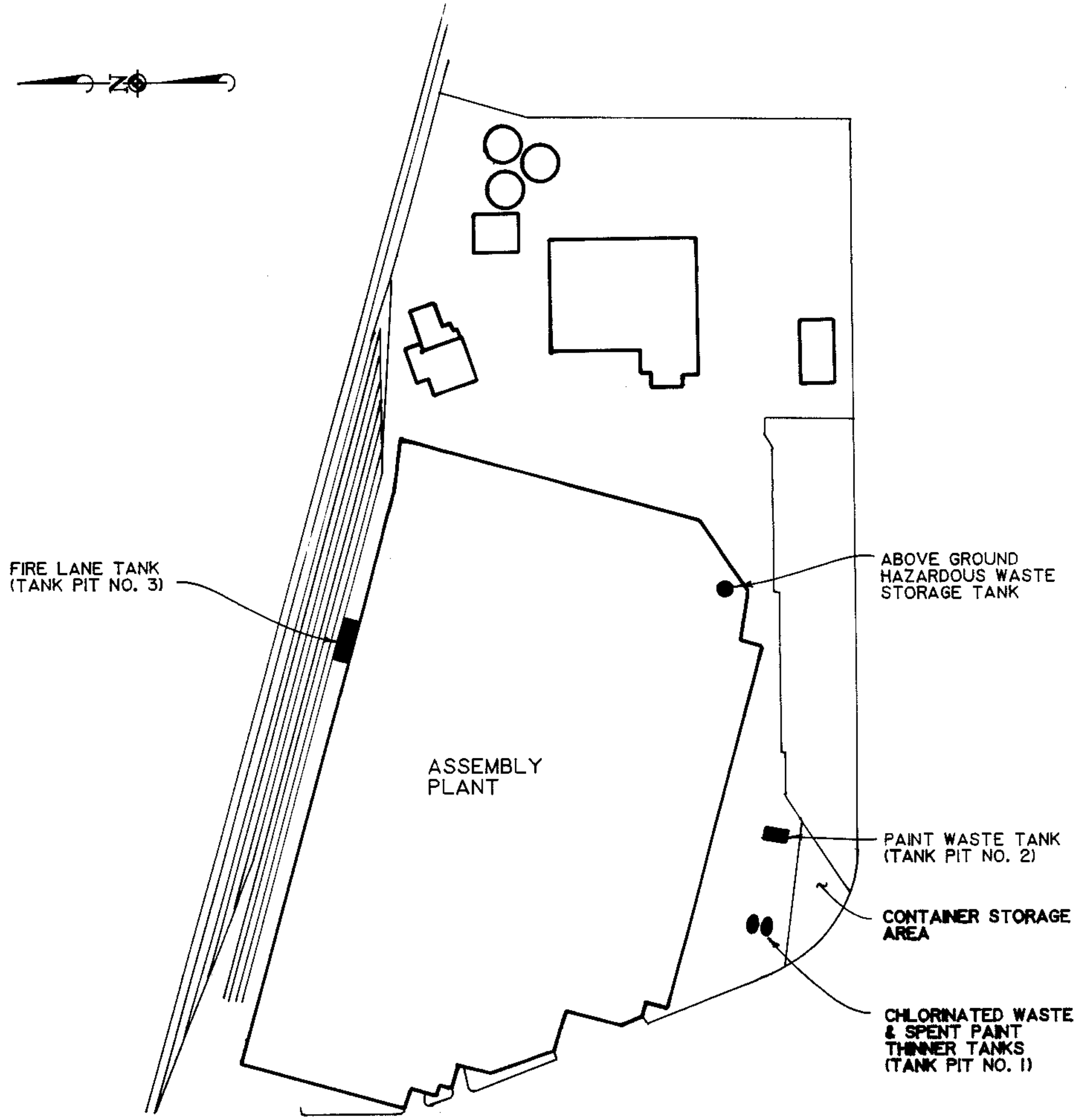
2.3 Hazardous Waste Facilities

Certain support facilities for Assembly Plant operations have been utilized as hazardous waste management units regulated by the Resource Conservation and Recovery Act (RCRA). These units are considered hazardous waste storage facilities and consist of a container storage area, an aboveground storage tank and four underground storage tanks. The locations of the hazardous waste management facilities are shown in Figure 2.

The container storage area consists of an elevated concrete storage pad which is curbed and drains to a closed sump. The container storage area was used for the storage of 55-gallon containers of spent paint thinner (D001), spent chlorinated solvent (F001), waste adhesive (D001), chromium sludge (D007) and waste solder (D008).

The aboveground storage tank is located inside the Assembly Plant on a concrete pad within a diked area. The aboveground storage tank was used for the storage of spent paint thinner (D001).

The underground storage tanks are all constructed of carbon steel and consist of one 6,000 gallon spent paint thinner tank, one 6,000 gallon spent chlorinated solvent tank, one 2,000 paint waste tank and one 12,500 gallon spent paint thinner tank (i.e., fire lane tank). Both 6,000 gallon tanks are located in a common tank pit which has a 30 in. concrete floor. The remaining two tanks are located in separate tank pits, although the fire lane tank is located in a tank pit which contains two other underground storage tanks which do



RCRA HAZARDOUS WASTE FACILITIES
GM-CPC
NORWOOD, OHIO

PROJECT NO.
21-73223

SCALE
1" = 30'

FIGURE NO.
2

ATEC

not store hazardous waste. The paint waste tank rests upon an 8 in. concrete pad which is equipped with a leachate collection system. The fire lane tank rests on a concrete saddle. All tanks are seven years old except for the fire lane tank which is 18 years old. All tanks are cathodically protected except for the paint waste tank. Plan and cross-sectional views of the tank systems are provided in Figures 3 through 7.

3.0 TECHNICAL APPROACH

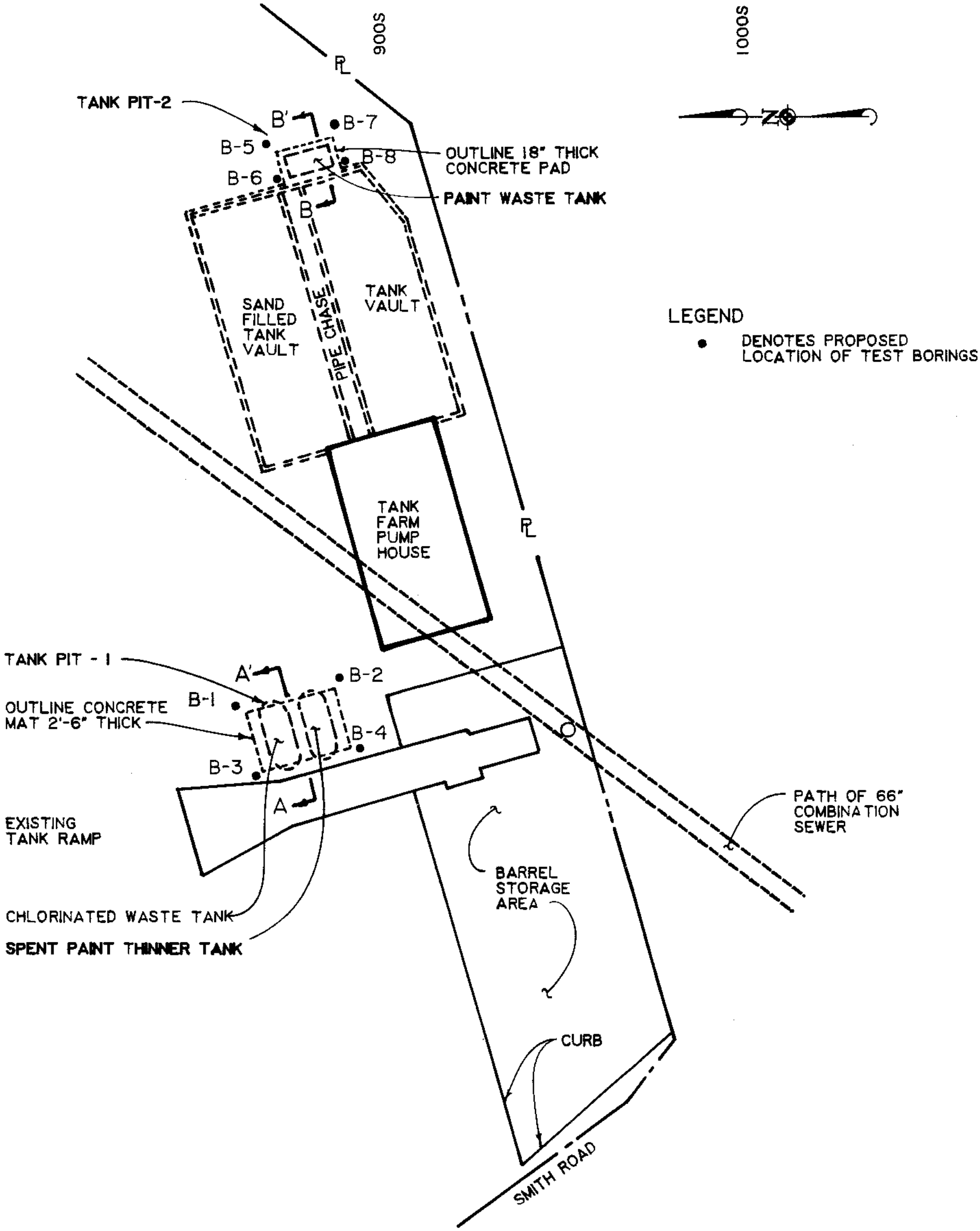
The basic technical approach for this demonstration involves implementing a soil sampling and analysis plan prior to removal of the underground tanks. This demonstration is designed in accordance with the conditions outlined in 52 Federal Register Page 8706 (March 19, 1987). The data generated by this plan will then be evaluated to determine if hazardous waste constituents, attributable to the unit operation, are present in the subsurface. If these constituents are detected during this sampling and analysis plan, decontamination levels will be established which ensure removal or decontamination of all materials which pose a substantial present or potential threat to human health or the environment.

These levels will be based on an analysis of the environmental fate of these constituents and an assessment of potentially exposed environmental receptors. Details of the sampling and analysis plan and the plan for establishing clean-up levels are provided in the following sections.

3.1 Proposed Sampling and Analysis Program

Prior to initiation of any subsurface sampling or closure activities, all tanks will be emptied of their contents and the contents will be properly disposed of. All utilities will be cleared and sampling sites will be located in the field. A site specific safety plan will be developed which will be reviewed with all field personnel.

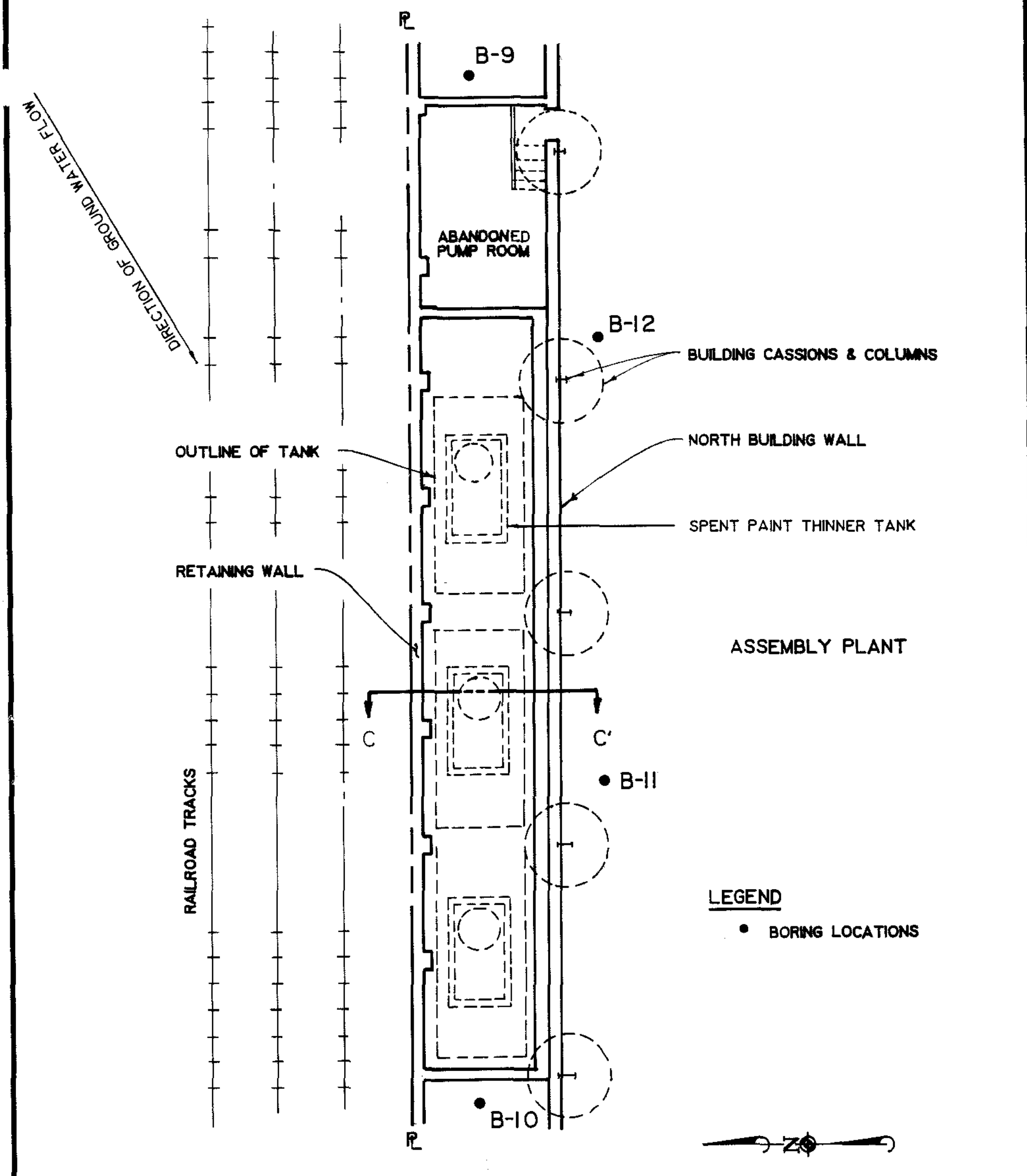
Four soil borings are proposed to be drilled around the perimeter of each of the three tank pits. All borings will be located as close to the underground storage tanks as possible. However, the presence of concrete pads, saddles and underground piping will dictate the exact locations of the borings. Borings B-1 through B-4 will be situated at each corner of the chlorinated solvent and spent-paint thinner tank pit (TP-1). Borings B-5, B-6, B-7 and B-8 will be located around the spent paint tank pit (TP-2). These boring locations are shown in Figure 3. Four borings (Borings B-9 through B-12 as shown in Figure 4) will be drilled in the area around the fire lane tank (TP-3). Drilling access



LOCATION MAP
TANK PIT NOS. 1 & 2
GM-CPC
NORWOOD, OHIO

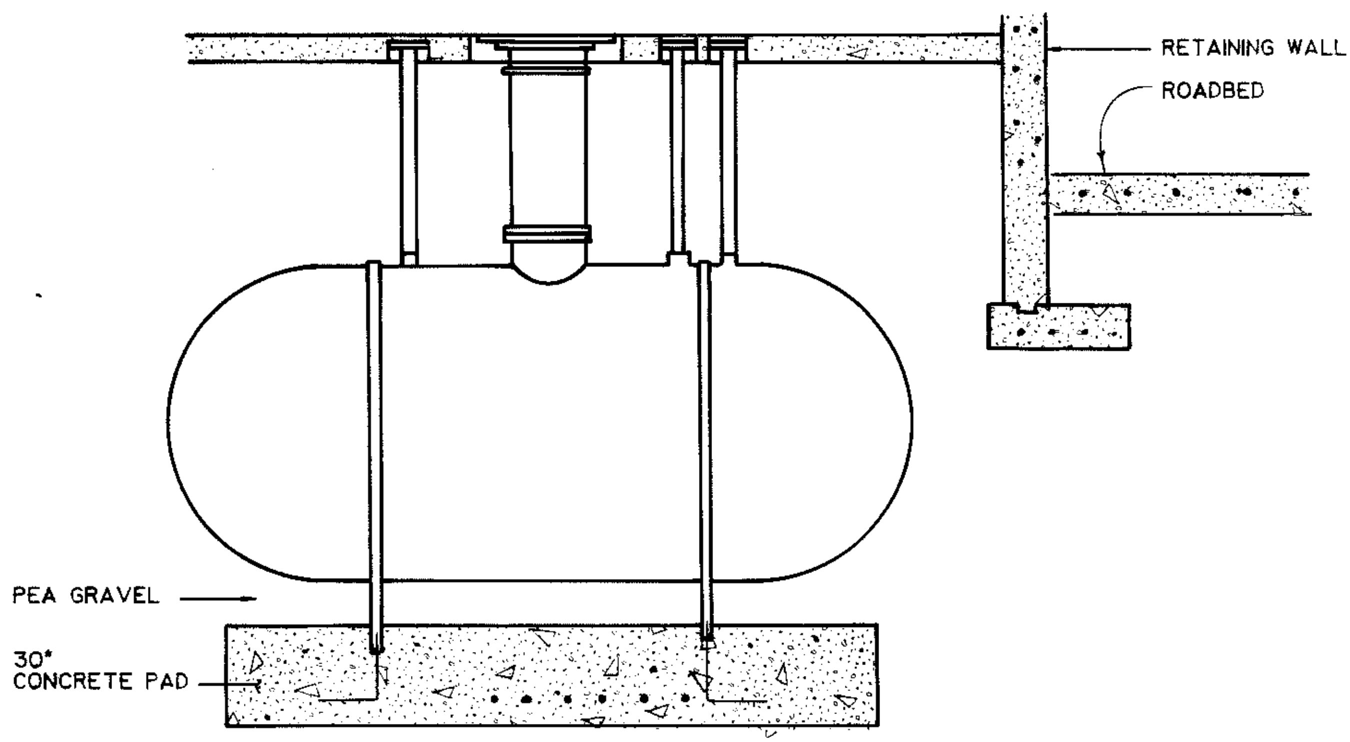
PROJECT NO.	21-73223
SCALE	1" = 30'
FIGURE NO.	3

ATEC



PLAN VIEW
TANK - PIT NO. 3
GM-CPC
NORWOOD, OHIO

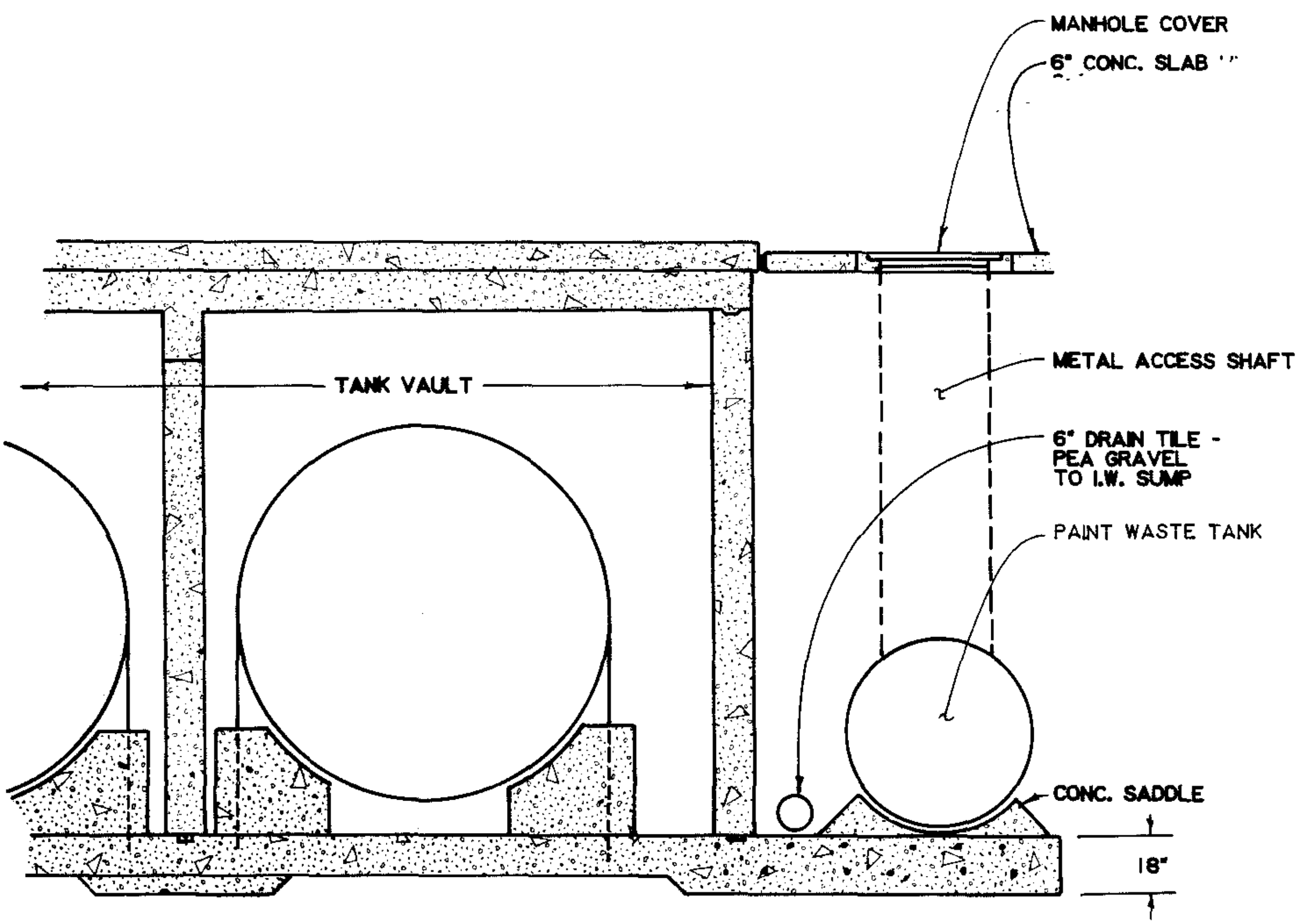
PROJECT NO. 21-73223	ATEC
SCALE NONE	
FIGURE NO. 4	



CROSS SECTION LINE A-A'
TANK PIT NO. 1
GM-CPC
NORWOOD, OHIO

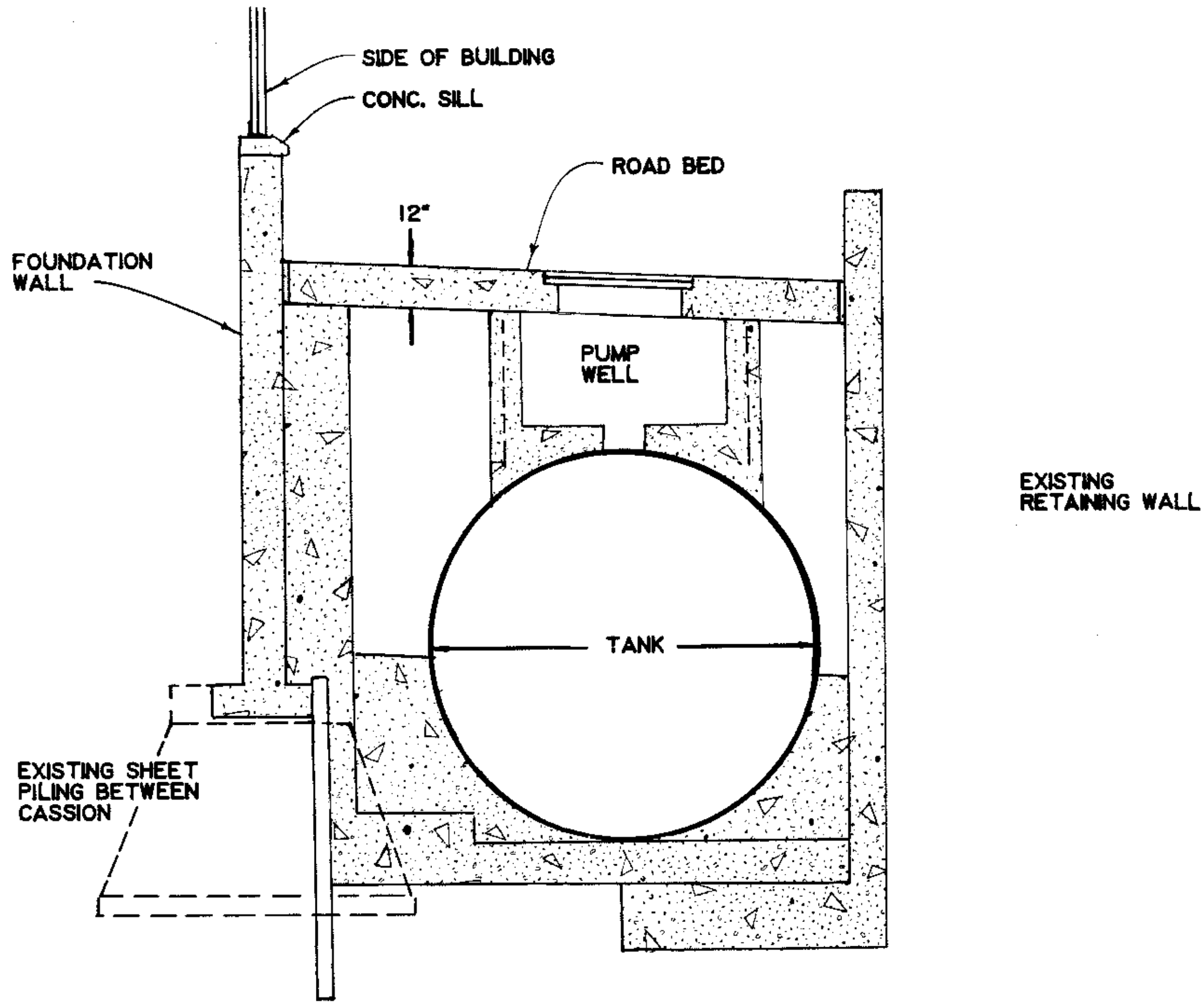
PROJECT NO.	21-73223
SCALE	NONE
FIGURE NO.	5

ATEC



CROSS SECTION LINE B-B'
TANK PIT NO. 2
GM-CPC
NORWOOD, OHIO

PROJECT NO. 21-73223	ATEC
SCALE NONE	
FIGURE NO. 6	



CROSS SECTION LINE C-C'
TANK PIT NO. 3
GM-CPC
NORWOOD, OHIO

PROJECT NO.	21-73223
SCALE	NONE
FIGURE NO.	7

ATEC

around the fire lane tank is extremely limited due to its proximity to the north property boundary, the railroad tracks and the north wall of the Assembly Plant. Due to these access restrictions slight modifications to the locations are necessary and no borings will be completed north of the tank pit. Since the direction of shallow groundwater flow is from northeast to southwest, the northern boring would be in an upgradient location and would not likely provide a substantial amount of information regarding potential soil contamination from tank operations. An additional boring will be drilled south of the tank pit to provide additional downgradient coverage. Boring B-9 will be off-set to the east due to the presence of an abandoned pump room. The northern wall of the Assembly Plant is adjacent to the tank pit, therefore, Borings B-11 and B-12 will be located directly inside the Assembly Plant.

3.1.1 Sampling Methods

Soil sampling will be performed at the locations mentioned in the preceding section as shown in Figures 3 and 4. All soil borings are to be advanced using 3/4 in. hollow stem augers. The proposed depth of exploration is 5 ft beneath the bottom elevation of the underground tank. Split-spoon samples will be collected at 2.0 ft continuous intervals (i.e., 0 to 2 ft, 2 to 4 ft, 4 to 6 ft, etc.). Each sample will be visually inspected for contamination and logged. An on-site field geologist will note color, texture, consistency, integrity and degree of induration as well as the presence of mottling, pitting and cracking. The soil samples will be classified using the Unified Soil Classification System (USCS).

In addition to the visual observations, total photoionizable vapor (TPV) emissions will be recorded for each sample. Monitoring for TPVs will be performed using a portable instrument called a "TIP" manufactured by Photovac, Inc. of Ontario, Canada. The TIP is equipped with a small pump which continuously draws air samples into an ionization chamber which is flooded with ultraviolet light. Ionization of the vapors within this chamber results in the generation of an electric current which relates to the concentration of vapors and is displayed on a liquid crystal diode (LCD) display on the instrument in parts per million (ppm). The ultraviolet lamp used in the TIP has an energy of about 10.6 electron volt (eV) and will ionize any vapors below this energy. Most of the light permanent gases (such as those in ambient air) have ionization potentials at 12 eV or more while many organic chemicals (mineral spirits, trichloroethylene, benzene, acetone, hexane, etc.) have ionization potentials below 10.5 eV.

For the purposes of this investigation, the TIP will be used as a screening tool for the presence of photoionizable contaminants. Following extrusion of the sample, the sample will be placed in a plastic sample bag and the pump inlet for the TIP placed in the bag for measurement. The highest value recorded during this procedure will be recorded. For screening purposes, ATEC relies on the calibration performed on the instrument at the factory. The factory calibrates the instrument to 100 ppm isobutylene, therefore, the values reported represent ppm as isobutylene.

The split-spoon samples will be placed in plastic bags immediately upon collection and the bags will be labeled and stored in coolers on-site. Three 0 to 6 in. discreet samples from each boring will be selected for analysis. The three samples will be selected as those samples which emit the highest level of TPV's during field monitoring. If no TPVs are detected during sampling, samples at the top, mid-point and base of the tank will be selected for analysis. Following completion of the drilling and sampling each borehole will be filled with a mixture of cuttings and bentonite and the surface will be patched with ready-mix concrete.

A decontamination station will be established at the Assembly Plant. The stations will have a base of plastic sheeting upon which a metal open top decontamination trough will rest. All decontamination of sampling equipment between boreholes will be conducted within this trough and any spillage of decontamination solutions upon the plastic sheeting will be collected with a wet/dry vacuum. Split-spoon samplers will be decontaminated by a trisodium phosphate (TSP) detergent wash followed by a distilled water and hexane rinse. Decontamination of the sampler will be performed before collection of any sample slated for laboratory analysis. All decontamination solvents will be of pesticide grade quality.

All hollow stem augers will be decontaminated before use by steam cleaning at the decontamination stations. Hollow stem augers will also be decontaminated between boreholes. All rinsate residuals will be collected on-site using a wet/dry vacuum and placed in U.S. Department of Transportation (DOT) approved Type 17H 55-gallon drums. Soil cuttings generated from the borings will be placed back in the auger hole and patched with concrete. However, some soil residuals will require drum storage. At the conclusion of the field work, these residuals will be analyzed to determine proper disposition of this material.

3.1.2 Laboratory Analyses

The collected samples will be analyzed for parameters which are indicative of the types of wastes previously stored in the underground storage tanks. All samples will be analyzed for volatile organic compounds (VOCs) as well as the other constituents listed in Table 1. VOCs were selected as testing parameters for all locations since the predominant components of the stored wastes at all units are organic solvents. The chlorinated waste consists of the F001 solvents (i.e., tetrachloroethylene, trichloroethylene, 1,1,1-trichloroethane, etc.) which were generated as a result of degreasing, paint stripping and cleaning operations. The spent paint thinner and paint waste consists predominantly of methyl ethyl ketone (MEK) which was generated during the cleaning of painting equipment. All of these compounds are detectable during VOC analyses.

Soil samples will also be analyzed for the heavy metals listed in Table 1. Although not predominant components of the waste materials, certain heavy metal constituents have been detected in previous analyses performed on the waste (in accordance with RCRA requirements) as shown in the laboratory data provided in Appendix A. Due to the presence of the constituents, the soil samples will also be analyzed for the heavy metals listed in Table 1.

Table 1

Sample Analysis Summary

Tank Content	Boring Identification	Analysis
Chlorinated Waste, Spent Paint Thinner	B-1, B-2, B-3, B-4	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Total Cyanide, Volatile Organics, pH
Paint Waste	B-5, B-6, B-7, B-8	Arsenic, Barium, Chromium, Volatile Organics, pH
Spent-Paint Thinner	B-9, B-10, B-11, B-12	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Volatile Organics, pH

Howard Laboratories, Inc. of Dayton, Ohio will be used to analyze all samples designated for analysis. Howard Laboratories has quantitative, semi-quantitative and qualitative quality control classifications and is familiar with U.S. EPA protocols for the analysis of environmental samples. The laboratory has performed subcontract work for the U.S. EPA and the OEPA to provide analytical testing for OEPA, RCRA and CERCLA investigations.

All analyses for this project will be performed in strict adherence to the techniques described in the U.S. EPA document "Test Methods for Evaluating Solid Waste-Physical/Chemical Methods", 3rd Edition (SW-846). A summary of the methods to be utilized is provided in Table 2.

Table 2

Summary of U.S. EPA Test Methods

Parameter	Preparation Method	Analytical Method
Arsenic	3010	7061
Barium	3010	7080
Cadmium	3010	7130/7131
Chromium	3010	7190
Lead	3010	7420
Mercury	3010	7470
Total Cyanide	-	9010
VOCs	3810	8240

3.2 Proposed Data Evaluation Program

The analytical data generated from the soil sampling and analysis program will be compared to site-specific limits which will be established according to site conditions. To establish site-specific limits for some or all the constituents, the environmental fate of the constituents will be established, potential receptors of the constituents will be identified and any impacts will be quantified. Site-specific limits will be based on the known site conditions, an inventory of known environmental receptors and predictions regarding the transport, the dispersion, transformation and retardation of these constituents in the subsurface. The following sections review the site conditions and describe the procedures for performing the receptor inventory and predicting the transport and fate of contaminants.

3.2.1 Site Conditions

A general review of the known site conditions is provided herein followed by information regarding further definition of the site conditions for the purposes of establishing alternate limits. The project site is situated in a physiographic feature known as the Duck Creek Valley or Norwood Trough. This trough was carved by the Ohio River and the depth to bedrock within the trough are very deep. The Norwood Trough is composed of consolidated plain sediments bounded on both sides by bedrock. The unconsolidated glacial sediments within the trough consists of deep glacial outwash deposits overlain by glacial drift consistency of varied mixture of sand, gravel and clay. The upper glacial drift deposits range from 100 to 130 ft in thickness and consist largely of cohesive soil strata with discontinuous beds of granular sandy deposits. From 130 to about 240 ft below the surface, outwash sand and gravel deposits are encountered which become more coarse-grained with depth.

The Assembly Plant is located southeast of the Globe Lot. The project area lies at El 635 to El 620 and the topography is gently sloping to the northeast. Surface drainage is controlled by catch basins which are connected to a 66 in. combined sanitary and storm sewer which traverses the property from the northeast to the southwest corner of the property. Process wastewater from GM operations were channeled through the on-site waste treatment facility.

During the extensive additions to the plant which occurred throughout the years, grade-raise fill was placed to control the topography of the site and to provide stable foundations for building purposes. Beneath the fill are natural glacial sediments composed predominantly of fine-grained silty clay soils with intermittent sand and silt zones and is representative of glacial drift. The glacial sediments are composed of slightly moist to moist, soft to hard sandy silty clay (CL) with trace of fine to coarse gravel.

Soil samples collected from the borings drilled around the underground tanks will be subjected to various physical tests in an effort to predict the behavior of constituents in the subsurface. One sample from each boring will be selected for physical testing. The hydraulic conductivity of each sample will be obtained by performing falling head permeability tests in the laboratory. These test results will be used to establish potential rates of constituent migration through the soils. The samples will also be analyzed for organic content and cation-exchange capacity. These test results will be used to predict the amount of constituent attenuation as it migrates through the soils.

3.2.2 Receptor Inventory

An inventory of all known environmental receptors within a one mile radius of the site will be performed. The present and predicted extent and uses of groundwater in the area will be obtained through City of Norwood water use service records supplemental as necessary by a house-to-house water well survey. The downgradient distance to the nearest well, the depth of the nearest downgradient well and the population served by the nearest downgradient well will be established using this information. The present and predicted extent and uses of surface water in the area will also be obtained using similar methodology. Downgradient surface water bodies will be located and the distance from the site to these bodies will be established. The distance to the nearest downstream water intake will also be determined. Any sensitive environmental species or habitants will be identified through contacts with the appropriate State agencies.

3.2.3 Transport and Fate of Contaminants

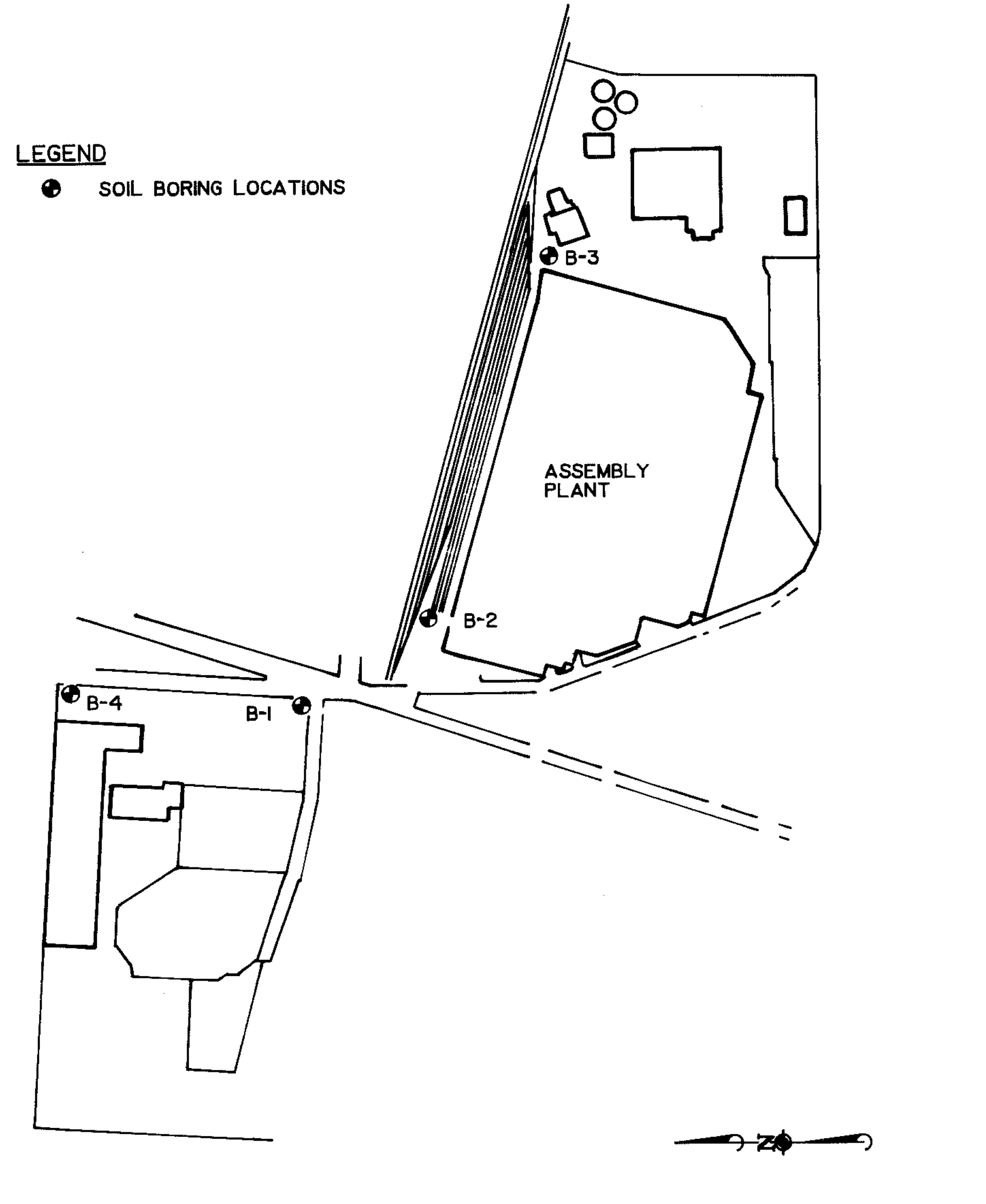
The transport and fate of contaminants in soil and groundwater will be predicted by estimating percolation rates and attenuation/adsorbtion capacities in the unsaturated zone and estimating the constituent flow rates, dispersion mechanisms and retardation factors in the saturated zone. The main tool to be used to make these predictions is the nomograph technique described by Donigian, et.al., in the U.S. EPA document

"Rapid Assessment of Potential Groundwater Contamination Under Emergency Response Conditions", 1983. This technique is considered to be a reliable method of estimating contaminant flux through the unsaturated zone to the groundwater and of predicting concentrations of constituents in groundwater at various receptors. The technique is referenced extensively in the Revised Draft Superfund Exposure Assessment Manual issued by the U.S. EPA in December, 1986, and in the Draft Superfund Health Assessment Manual issued by the U.S. EPA in May 1985. The target contaminant selected for use in the Donigian model will be the most toxic constituent detected in samples collected around any one tank pit. The mass of the target contaminant will be determined by a weighted average of the target contaminant concentrations as measured in samples collected around each tank pit.

Once the level of contaminants present at the most sensitive receptor has been predicted, the predicted level will be compared with the applicable regulatory limits. If the most sensitive receptor is a water well the predicted limit will be compared to drinking water standards, health advisory levels, maximum contaminant levels or other appropriate standards. If the most sensitive receptor is a surface water body, the predicted limit will be compared with either background levels for the surface water body or aquatic toxicity levels. If the predicted level of contaminants at the most sensitive receptor is greater than the appropriate regulatory limit, then the soil will be considered contaminated. Soil which is considered contaminated by this method will either be removed or treated in-place. Soil sampling will be performed after removal or treatment to ensure that soils designated to remain in-place following closure do not contain constituent levels which would result in contamination of the most sensitive receptor at levels above the appropriate limit.

3.3 Establishment of Background Levels

Should it be necessary to establish background levels for comparison purposes the following procedure is proposed. To establish background levels, GM intends to drill four soil borings at the locations shown in Figure 8. These locations have been chosen as background sampling sites since they are located at the suspected upgradient limits of GM property, are located where no known manufacturing or waste management operations have occurred and are not located near drainage swales or other known features which may interfere with establishing background soil conditions. It is believed that these locations will provide the most representative samples for background characterization. Split-spoon soil samples will be collected at 5.0 ft intervals (3.5 to 5.0 ft, 8.5 to 10.0 ft and 13.5 to 15.0 ft) using the techniques described previously. Given the history of this area, it is likely



BACKGROUND SOIL LOCATIONS
GLOBE LOT & ASSEMBLY PLANT
GM-CPC
NORWOOD, OHIO

PROJECT NO. 21-73223

SCALE 1" = 500'

FIGURE NO. 8

ATEC

that at least the first sample will be composed of fill soils. The samples will be analyzed individually for the constituents listed in Table 1. Background levels will be compared to sample levels by determining if the "t" statistic calculated according to Appendix B exceeds the criterial "t" statistic at the 95 percent significance level.

4.0 IMPLEMENTATION SCHEDULE

The following schedule is proposed for proceeding with this evaluation.

Task	Completion Date
Submit Plan to OEPA	February 3, 1988
Receive OEPA Comments	February 15, 1988
Perform Soil Borings	February 26, 1988*
Perform Laboratory Analysis	March 21, 1988
Perform Receptor Inventory	March 21, 1988
Establish and Submit Alternate Limits	April 4, 1988

*Contingent upon weather conditions

Status reports documenting the progress of the work efforts will be submitted to the OEPA on a monthly basis.

APPENDIX-A

Received: 12/16/86 01/31/87 12:32:33 Work Order # 87 01 108

REPORT TO: GM CORP.
CPC GROUP
4726 SMITH RD.
NORWOOD, PHIO 45212
ATTEN: BILL STANLEY

PREPARED BY: ENVIRONMENTAL ENTERPRISES INC
10147 Springfield Pike
Cincinnati, Ohio 45215

Wayne Collier
CERTIFIED BY

ATTEN: Wayne Collier
PHONE: (513) 772-2818

CONTACT: BRAD TUTTLE

CLIENT: GM01 SAMPLES: 18
COMPANY: GM NORWOOD
FACILITY:

Enclosed are the results of specified samples submitted for analyses. If you have any questions please use "LAB #" for faster identification.

OHIO EPA CERTIFICATION: CHEMICAL 4095

WORK ID: VARIOUS SAMPLE ANALYSIS
TAKEN: 12/4-12/10
TRANS: DELIVERED
TYPE: SOLID & LIQUID
P.O. #: N14246M
INV. #: 1142

03, 04 Paint Waste

09, 10 Chlorinated Waste

11 Paint-Thinner Waste

SAMPLE IDENTIFICATION

01 9981917 DEADNER
02 WASTE WTR.TREAT.SLUDGE
03 PAINT SLUDGE 12-86-5 Paint
04 PAINT SLUDGE 12-85-6 Waste
05 ELPO SLUDGE 12-86-9
06 BONDERITE SLUDGE 12-86-7
07 ROTO BLAST SLUDGE
08 BODY SHOP VACUUM DUST
09 SW ALIPHATIC SOLV. 12-86-1 Chl.
10 SW ALIPHATIC SOLV. 12-86-2 Solvent
11 SW WASTE PNT.THIN. 12-86-3 Paint Thinner
12 SW 12-86-11-9981321 ADHES.
13 SW 12-86-12-9980621 ADHES.
14 SW-12-86-13-9982192 SEAL.
15 SW-12-86-14-9981450 SEAL.
16 SW 12-86-16 WASTE OIL
17 SW 12-86-17 EQUIPMENT OIL
18 SW 12-86-18 EQUIPMENT OIL

TEST CODES and NAMES used on this report

Code	Name	Code	Name
AG	SILVER	PB	LEAD
AGEP	SILVER,EP	PBEP	LEAD,EP
AS	ARSENIC	PCB	POLYCHLORINATED BIPHENYLS
ASEP	ARSENIC,EP	PH	PH
BA	BARIUM	PHOS	PHOSPHORUS
BAEP	BARIUM,EP	REAC	REACTTIVITY
BRO	BROMIDE	SE	SELENIUM
CD	CADMIUM	SEEP	SELENIUM, EP
CDEP	CADMIUM,EP	SG	SPECIFIC GRAVITY
CLI	CHLORIDE	S IDE	SULFIDE
CNT	CYANIDE TOTAL	TDS	DISSOLVED SOLIDS
CR	CHROMIUM	TKN	NITROGEN
CREP	CHROMIUM EP	TS	TOTAL SOLIDS
DIG	METAL DIGESTION	TSS	TOTAL SUSPENDED SOLIDS
EXT	EXTRACTION		
F	FLOURIDE		
FP	FLASH POINT		
HC	HEAT CONTENT		
HG	MERCURY		
HGEP	MERCURY,EP		
I	IODIDE		

Received: 12/16/86 Results By Test

TEST CODE default units	Sample 01 (entered units)	Sample 02 (entered units)	Sample 03 Paint Waste (entered units)	Sample 04 Paint Waste (entered units)	Sample 05 (entered units)
AG	1.12	<0.46	<0.05	<0.05	<0.75
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
AGEP	<0.05	<0.05	<0.05	<0.05	<0.05
mg/l					
AS	8.13	7.90	0.13	0.64	0.82
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ASEP	<0.05	<0.05	<0.05	<0.05	<0.05
mg/l					
BA	625	368	12.5	941	7.5
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BAEP	1.8	0.8	0.8	2.4	<0.3
mg/l					
BRO	<1	<1	<1	<1	<1
%					
CD	1.12	1.61	<0.05	<0.25	<0.25
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CDEP	<0.02	<0.02	<0.02	<0.02	<0.02
mg/l					
CLI	<1	<1	<1	<1	<1
%					
CNT	<0.02	<0.02	<0.02	<0.02	<0.02
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CR	141	21.6	0.50	10.4	27.4
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
CREP	<0.05	<0.05	<0.05	0.08	0.16
mg/l					
F	763	150	<75	<60	<57
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
FP	<80	>200	>200	>200	>200
deg F					
HC	7800	<100	<100	<100	5600
BTU/#					
HG	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HGEP	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l					
I	<1	<1	<1	<1	<1
%					

Received: 12/16/86 Results By Test Continued From Above

			Paint Waste	Paint Waste	
PB	27	920	<0.5	54.5	4.0
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	%
PBEP	<0.3	1.4	<0.3	0.5	1400
mg/l					
PH	8.7	7.9	7.7	8.0	7.4
s.u.					
PHOS	149	174	40	16	11
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SE	<2.2	<0.05	<0.05	<0.06	<0.05
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
SEEP	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l					
SG	1.56	0.76	0.83	1.16	0.98
	-	-	-	-	-
S_IDE	<100	<100	<100	<100	<100
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TDS	NA	NA	NA	NA	NA
mg/l					
TKN	382	<60	430	1560	<60
mg/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TS	83	28	1	31	84
%					
TSS	NA	NA	NA	NA	NA
mg/l					

				Chlorinated Solvent Waste	Chlorinated Solvent Waste
TEST CODE default units	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08 (entered units)	Sample 09 (entered units)	Sample 10 (entered units)
AG	<0.24	<0.74	8.15	<0.10	<0.05
mg/l	mg/kg	mg/kg	mg/kg		
AGEP	<0.05	<0.05	<0.05	NA	NA
mg/l					
AS	3.86	8.40	0.15	1.60	0.34
mg/l	mg/kg	mg/kg	mg/kg		
ASEP	<0.05	<0.05	0.15	NA	NA
mg/l					
BA	29	420	<2.5	65.0	4.0
mg/l	mg/kg	mg/kg	mg/kg		
BAEP	<0.3	<0.3	<0.3	NA	NA
mg/l					

Received: 12/16/86

Results By Test

Continued From Above
Chlorinated Solvent Waste

BRO	<1	<1	<1	<1	<1
%					
CD	0.97	1.98	3.95	6.4	0.45
mg/l	mg/kg	mg/kg	mg/kg		
CDEP	<0.02	<0.02	<0.02	NA	NA
mg/l					
CLI	<1	<1	<1	1	2
%					
CNT	<0.02	<0.02	<0.02	0.13	<0.02
mg/l	mg/kg	mg/kg	mg/kg		
CR	13	108	18.5	7.80	1.80
mg/l	mg/kg	mg/kg	mg/kg		
CREP	<0.05	0.38	0.16	NA	NA
mg/l					
F	3540	4410	409	101	<59
mg/l	mg/kg	mg/kg	mg/kg		
FP	>200	>200	>200	<80	<80
deg F					
HC	<100	6400	1600	<100	18700
BTU/#					
HG	0.02	<0.01	0.12	0.04	<0.01
mg/l	mg/kg	mg/kg	mg/kg		
HGEP	<0.01	<0.01	<0.01	NA	NA
mg/l					
I	<1	<1	<1	<1	<1
%					
PB	67.6	119	98.8	58.0	10.0
mg/l	mg/kg	mg/kg	mg/kg		
PBEP	<0.3	<0.3	<0.3	NA	NA
mg/l					
PH	4.1	7.2	7.5	8.6	8.7
s.u.					
PHOS	832	653	16	171	47
mg/l	mg/kg	mg/kg	mg/kg		
SE	<0.25	<1.0	0.05	0.2	<0.01
mg/l	mg/kg	mg/kg	mg/kg		
SEEP	<0.01	<0.01	<0.01	NA	NA
mg/l					
SG	1.05	0.67	1.52	0.85	0.80
S_IDE	<100	<100	<100	<100	<100
mg/l	mg/kg	mg/kg	mg/kg		

Chlorinated Solvent Waste

TDS	NA	NA	NA	NA	NA
mg/l					
TKN	1580	<60	<60	<72	<60
mg/l	mg/kg	mg/kg	mg/kg		
TS	38	78	100	5	<1
%					
TSS	NA	NA	NA	NA	NA
mg/l					

Waste Paint Thinner

TEST CODE default units	Sample 11 (entered units)	Sample 12 (entered units)	Sample 13 (entered units)	Sample 14 (entered units)	Sample 15 (entered units)
AG	<0.10	<0.23	<0.24	2.70	18.3
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
AGEP	NA	<0.05	<0.05	<0.05	<0.05
mg/l					
AS	0.83	2.69	1.92	1.98	3.29
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
ASEP	NA	<0.05	<0.05	<0.05	<0.05
mg/l					
BA	190	<2.3	7.2	200	<2.3
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
BAEP	NA	<0.3	<0.3	<0.3	<0.3
mg/l					
BRO	<1	<1	<1	<1	<1
%					
CD	0.35	<0.23	<0.24	2.25	<0.23
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
CDEP	NA	<0.02	<0.02	<0.02	<0.02
mg/l					
CLI	<1	<1	<1	<1	<1
%					
CNT	<0.02	<0.02	<0.02	<0.02	<0.02
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
CR	65.0	1.40	3.60	<0.05	3.42
mg/l		mg/kg	mg/kg	mg/kg	mg/kg
CREP	NA	<0.05	<0.05	<0.05	<0.05
mg/l					
F	<59	<56	<44	<39	<70
mg/l		mg/kg	mg/kg	mg/kg	mg/kg

Received: 12/16/86 Waste Paint Thinner **Results By Test** Continued From Above

FP deg F	<80	<80	<80	107	114
HC BTU/#	13300	15500	13500	6300	10200
HG mg/l	0.09	0.10 mg/kg	0.06 mg/kg	<0.01 mg/kg	0.04 mg/kg
HGEP mg/l	NA	<0.01	<0.05	<0.01	<0.01
I %	<1	<1	<1	<1	<1
PB mg/l	180	<2.3 mg/kg	<2.4 mg/kg	40.5 mg/kg	<2.3 mg/kg
PBEP mg/l	NA	1.8	<0.3	<0.3	<0.3
PH s.u.	6.0	5.3	6.7	7.2	4.5
PHOS mg/l	65	32 mg/kg	24 mg/kg	5 mg/kg	26 mg/kg
SE mg/l	<0.5	0.10 mg/kg	<2.4 mg/kg	<2.4 mg/kg	<2.4 mg/kg
SEEP mg/l	NA	<0.01	<0.01	<0.01	<0.01
SG	0.57	1.04	0.93	1.72	1.11
S_IDE mg/l	<100	<100 mg/kg	<100 mg/kg	<100 mg/kg	<100 mg/kg
TDS mg/l	NA	NA	NA	NA	NA
TKN mg/l	<60	<60 mg/kg	168 mg/kg	112 mg/kg	133 mg/kg
TS %	26	65	66	97	95
TSS mg/l	NA	NA	NA	NA	NA

TEST CODE default units	Sample 16 (entered units)	Sample 17 (entered units)	Sample 18 (entered units)
AS mg/l	0.86	0.76	0.42

A.4.3

Chevrolet·Pontiac·Canada Group
Norwood Plant
General Motors Corporation
P.O. Box 12171
Norwood, Ohio 45212

RECEIVED
OCT 19 1988
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
OFFICE OF THE DIRECTOR

October 17, 1988

Mr. Richard L. Shank, PH.D Director
Ohio Environmental Protection Agency
P.O.Box 1049, 1800 Water Mark Dr.
Columbus, Ohio 43266

Mr. Basil G. Constantelos, Director
Waste Management Division USEPA
Region V, 230 South Dearborn Street
Chicago, Illinois 60604

Re: Closure Certification
General Motors Corporation
C.P.C. Group, Norwood Plant
OHD004262289/05-31-0441
OHD004260089

Dear Directors Shank and Constantelos:

This letter is to fulfill the requirements of the Ohio Administrative Code Rule 3745-66-15 and 40 CFR Section 265.115 which requires certification by an authorized corporate officer representing the owner of a hazardous waste facility that such facility has been closed in accordance with the approved closure plan.

Attached is the certification from Ms. Shirley McMaster, an independent registered professional engineer contracted by G.M. to certifying the closure of the Norwood Hazardous Waste Facility in accordance with the approved closure plan. The approved closure plan is incorporated in correspondence from Ohio EPA dated October 19, 1987, September 29, 1988 and from USEPA of January 6, 1988.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. This certification is made on behalf of General Motors Corporation, owner and operator of CPC Norwood, located at 4726 Smith Road in Norwood, Ohio 45212.

Sincerely

Donald A. True

Donald A. True
Director of Operations
CPC Norwood-GMC
On behalf of General Motor

cc: Thomas Crepeau/DSHWM Central File, Ohio EPA
Rebecca Storm, USEPA, Region V
Richard Robertson, SWDO, Ohio EPA
Lenora Garey, CPC Facilities

CERTIFICATE OF CLOSURE

Richard L. Shank, Ph.D.
Director-Ohio Environmental Protection Agency
P.O. Box 1049, 1800 Watermark Drive
Columbus, OH 43266-0149

Dear Dr. Shank:

RE: Certificate of Closure--Interim Status Hazard-Waste Storage Units, General Motors Corporation, C-P-C Group Norwood, Ohio, EPA ID No. OHD004260089, Ohio Permit No. 05-31-0441

I hereby certify that the Norwood Hazardous Waste Facility, specifically including underground Tanks 11, 12, and 13, the drum storage pad, the aboveground tank in the Red Label Room, and the underground tanks in the North Fire Lane have been closed in accordance with the approved Closure Plan.

Sincerely,

Shirley McMaster

Shirley McMaster, P.E.
Ohio Serial No. 50331

pc: Mr. William Stanley
General Motors Corporation
Chevrolet-Pontiac-Canada Group
P.O. Box 12171
4726 Smith Road
Norwood, OH 45212

Mr. Basil G. Constantelos
Director
Waste of Management Division
United States Environmental Protection Agency, Region V
230 Dearborn Street
Chicago, IL 60604

A.4.5

DTW217888327

O: WMD
cc: RF

General Motors Corporation

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APR 04 1990
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
OFFICE OF THE DIRECTOR

Mr. Valdas V. Adamkus
Regional Administrator
U.S. EPA Region V
230 S. Dearborn
Chicago, IL 60604

Dear Mr. Adamkus:

I am the chief financial officer of General Motors Corporation, 3044 West Grand Boulevard, Detroit, Michigan 48202. This letter is in support of the use of the financial test to demonstrate financial responsibility for liability coverage and closure and/or post-closure care as specified in Subpart H of 40 CFR Parts 264 and 265.

The firm identified above is the owner or operator of the following facilities for which liability coverage for both sudden and non-sudden accidental occurrences is being demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265: See Attachments A and B.

The firm identified above guarantees, through the corporate guarantee specified in Subpart H of 40 CFR Parts 264 and 265, liability coverage for both sudden and non-sudden accidental occurrences at the following facilities owned or operated by the following subsidiaries of the firm: None.

1. The firm identified above owns or operates the following facilities for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by the test are shown for each facility: See Attachments A and B.

2. The firm identified above guarantees, through the corporate guarantee specified in Subpart H of 40 CFR Parts 264 and 265, the closure and post-closure care of the following facilities owned or operated by its subsidiaries. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility: None.

3. In States where EPA is not administering the financial requirements of Subpart H of 40 CFR Parts 264 and 265, this firm is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by such a test are shown for each facility: See Attachment B.

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U.S. EPA REGION 5

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COPY

4. The firm identified above owns or operates the following hazardous waste management facilities for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Parts 264 and 265 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility: None.

5. This firm is the owner or operator of the following UIC facilities for which financial assurance for plugging and abandonment is required under Part 144. The current closure cost estimates as required by 40 CFR 144.62 are shown for each facility: None.

This firm is required to file a Form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this owner or operator ends on December 31. The figures for the following items marked with an asterisk are derived from this firm's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 1987.

ALTERNATIVE I
($ In Millions)

1.	Sum of current closure and post-closure cost estimates (total of all cost estimates listed above)	$ 59.1
2.	Amount of annual aggregate liability coverage to be demonstrated	$ 8.0
3.	Sum of lines 1 and 2	$ 67.1
*4.	Total liabilities (if any portion of your closure or post-closure cost estimates is included in your total liabilities, you may deduct that portion from this line and add that amount to lines 5 and 6)	$ 54,196.8
*5.	Tangible net worth	$ 28,038.7
*6.	Net worth	$ 33,225.1
*7.	Current assets	$ 39,771.5
*8.	Current liabilities	$ 25,528.2
9.	Net working capital (line 7 minus line 8)	$ 14,243.3
*10.	The sum of net income plus depreciation, depletion, and amortization	$ 9,662.9
*11.	Total assets in U.S. (required only if less than 90% of assets are located in the U.S.)	$ 68,168.1

		YES	NO
12.	Is line 5 at least $10 million?	X	
13.	Is line 5 at least 6 times line 3?	X	
14.	Is line 9 at least 6 times line 3?	X	
*15.	Are at least 90% of assets located in the U.S.? If not complete line 16.		X
16.	Is line 11 at least 6 times line 3?	X	
17.	Is line 4 divided by line 6 less than 2.0?	X	
18.	Is line 10 divided by line 4 greater than 0.1?	X	
19.	Is line 7 divided by line 8 greater than 1.5?	X	

I hereby certify that the wording of this letter is identical to the wording specified in 40 CFR 264.151(g) as such regulations were constituted on the date shown immediately below..

F. A. Smith
Executive Vice President
March 30, 1988

9275f-77

Deloitte Haskins+Sells

1114 Avenue of the Americas
New York, New York 10036-7778
(212) 790-0500
International Telex: 66262
ITT Telex: 4995707

General Motors Corporation:

We have examined the Consolidated Balance Sheet of General Motors Corporation (the "Corporation") and consolidated subsidiaries as of December 31, 1987 and the related Statements of Consolidated Income and Changes in Consolidated Financial Position for the year then ended, and have issued our opinion thereon dated February 8, 1988. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We have not performed any auditing procedures beyond the date of our opinion on the 1987 financial statements; accordingly, this report is based on our knowledge as of that date and should be read with that understanding.

At your request, we have performed the procedures enumerated below with respect to the accompanying letter from Mr. F. A. Smith to the Regional Administrator, U.S. EPA Region V, dated March 30, 1988. It is understood that this report is solely for filing with the addressee of the accompanying letter, and is not to be used for any other purpose. The procedures that we performed are summarized as follows:

1. We compared the amounts included in items 6, 7, 8 and 11 under the caption Alternative I in the letter referred to above with the corresponding amounts in the financial statements referred to in the first paragraph.

2. We recomputed from, or reconciled to, the financial statements referred to in the first paragraph the information included in items 4, 5, 10 and 15 under the caption Alternative I in the letter referred to above.

Because the procedures referred to in the preceding paragraph were not sufficient to constitute an examination made in accordance with generally accepted auditing standards, we do not express an opinion on any of the information or amounts listed under the caption Alternative I in the aforementioned letter. In performing the procedures referred to above, however, no matters came to our attention that caused us to believe that the information or amounts included in items 4, 5, 6, 7, 8, 10, 11 and 15 should be adjusted.

Deloitte Haskins & Sells

March 30, 1988

ORIGINAL COPY OF LETTER AND ENCLOSURE (1987 ANNUAL REPORT) ARE FILED AT:

OHD 020 632 998
GMC BOC LORDSTDWN ASSEMBLY
LORDSTOWN, OHIO

OhioEPA
State Of Ohio Environmental Protection Agency
P.O. Box 1049, 361 East Broad St., Columbus, Ohio 43216-1049
4)466-8565

Richard F. Celeste, Governor

RE: General Motors Corp.
OHD 004260089
OHD 050502273
OHD 045557766
OHD 060928561
OHD 004255410
OHD 097622336
OHD 004294419
OHD 004201091
OHD 017958604
OHD 000817577
OHD 052151701
OHD 000817023
OHD 020632998
OHD 041063074
OHD 980569388
OHD 001880442
OHD 018414292
OHD 000817346
OHD 083321091

Mr. Mitchell P. Zydb
Env. Activities Staff
General Motors Corp.
General Motors Technical Center
30400 Mound Road
Warren, MI 48090-9015

July 28, 1986

Dear Mr. Zydb:

I hereby acknowledge the receipt of a 1986 RCRA financial test demonstration update, prepared on behalf of the facilities referenced above.

Ohio EPA has completed its review of General Motors Corp.'s financial test submission. In general, General Motors Corp. appears to meet the financial test criteria. However, I have noted some problems that should be corrected or clarified concerning the financial test demonstration. Please clarify or correct the following:

- o Explain why the closure costs have decreased or have not changed since last year's financial test filing for the following facilities:

  No Change:
  OHD 005050273
  KSD 007145899

  Decreased from March 1985 filing:

TXC 008018004	LAD 089317341
IND 000803734	MID 005356712
IND 006036099	MID 005356795
ILD 005141551	MID 041793340
IND 006413348	MID 005356688
ILK 006009690	MID 000809905
OHD 097622336	MID 005356951
OHD 000817346	MID 082220757
MSD 065462517	WID 007114813

- o Explain why the closure costs for the following facilities were not included in this year's financial test filing:

  OHD 000817585
  OHD 041063074
  MAD 019369602
  NYD 012871489
  NYD 002026565
  IND 094469913
  IND 000806802
  TXD 095217204
  LAD 067033944
  MOD 000822668
  IAD 000686899
  CAD 008295719
  CAD 000051458
  CAD 009305848

There are several different closure costs on file. Explain differences in these reported amounts:

	Cost from the Financial Test	Cost as Indicated in the Annual Report	Cost Amount on File in our District Office
OHD 004260089	$ 232,400	$ 224,900	None
OHD 005050273	428,500	454,000	None
OHD 045557766	74,000	74,000	None
OHD 060928561	75,500	75,400	None
OHD 004255410	80,400	77,300	$ 77,300
OHD 097622336	32,900	28,500	28,500
OHD 004294419	18,800	20,000	None
OHD 004201091 closure	2,798,000	2,680,000	2,606,000
post closure	None	1,000,000	None
OHD 017958604	33,600	33,600	None
OHD 000817577 closure	250,700	4,150,695	None
post closure	3,900,000	130,000	None
OHD 052151701	54,400	42,200	46,000,000
OHD 000817023	42,200	54,400	36,900
OHD 020632998	531,800	350,100	865,314
OHD 041063074	265,900	265,900	None
OHD 980569388	85,000	132,600	None
OHD 001880442	389,200	403,000	None
OHD 018414292	14,400	14,400	None
OHD 000817346	147,700	148,200	1,874,300
OHD 083321091	7,220	None	None

Please submit the corrected information to my attention by August 29, 1986. If you have questions, please contact me at (614) 462-6733.

Sincerely,

Edward A. Kitchen

Edward A. Kitchen
Surveillance & Enforcement Section
Division of Solid & Hazardous
Waste Management

cc: Dave Sholtis, DSHWM
Thomas R. Wirth, GMC
J. F. Darst, GMC
Karen J. Berner, GMC
John S. Takach, GMC
Mark Dryden, GMC
L. P. Randall, GMC
Robert E. Kerr, GMC
Gerry Killeen, GMC
Howard P. Jordan, GMC
Raymond Stiger, GMC
David V. Kloppenburg, GMC
Vincent Festa, GMC
David Munson, GMC
Charles B. Hogan, GMC
Dave Wertz, NEDO
Ben Chambers, NWDO
Steve Hamlin, SEDO
Don Marshall, SWDO
Steve Rath, CDO

GM

OHD-004-260-089

General Motors Corporation

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U. S. EPA REGION 5
OFFICE OF REGIONAL ADMINISTRATOR

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7 1986
U.S. EPA, REGION V
WASTE MANAGEMENT DIVISION
HAZARDOUS WASTE ENFORCEMENT

Mr. Valdas V. Adamkus
Regional Administrator
U.S. EPA Region V
230 S. Dearborn
Chicago, IL 60604

Dear Mr. Adamkus:

I am the chief financial officer of General Motors Corporation, 3044 West Grand Boulevard, Detroit, Michigan 48202. This letter is in support of the use of the financial test to demonstrate financial responsibility for liability coverage and closure and/or post-closure care as specified in Subpart H of 40 CFR Parts 264 and 265.

The owner or operator identified above is the owner or operator of the following facilities for which liability coverage is being demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265: See Attachment A.

1. The owner or operator identified above owns or operates the following facilities for which financial assurance for closure or post-closure care is demonstrated through the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by the test are shown for each facility: See Attachment A.

2. The owner or operator identified above guarantees, through the corporate guarantee specified in Subpart H of 40 CFR Parts 264 and 265, the closure and post-closure care of the following facilities owned or operated by its subsidiaries. The current cost estimates for the closure or post-closure care so guaranteed are shown for each facility: None.

3. In States where EPA is not administering the financial requirements of Subpart H of 40 CFR Parts 264 and 265, this owner or operator is demonstrating financial assurance for the closure or post-closure care of the following facilities through the use of a test equivalent or substantially equivalent to the financial test specified in Subpart H of 40 CFR Parts 264 and 265. The current closure and/or post-closure cost estimates covered by such a test are shown for each facility: See Attachment B.

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4. The owner or operator identified above owns or operates the following hazardous waste management facilities for which financial assurance for closure or, if a disposal facility, post-closure care, is not demonstrated either to EPA or a State through the financial test or any other financial assurance mechanism specified in Subpart H of 40 CFR Parts 264 and 265 or equivalent or substantially equivalent State mechanisms. The current closure and/or post-closure cost estimates not covered by such financial assurance are shown for each facility: None.

This owner or operator is required to file a Form 10-K with the Securities and Exchange Commission (SEC) for the latest fiscal year.

The fiscal year of this owner or operator ends on December 31. The figures for the following items marked with an asterisk are derived from this owner's or operator's independently audited, year-end financial statements for the latest completed fiscal year, ended December 31, 1985.

ALTERNATIVE I
($ In Millions)

1.	Sum of current closure and post-closure cost estimates (total of all cost estimates listed above)	$ 46.0
2.	Amount of annual aggregate liability coverage to be demonstrated	$ 8.0
3.	Sum of lines 1 and 2	$ 54.0
*4.	Total liabilities (if any portion of your closure or post-closure cost estimates is included in your total liabilities, you may deduct that portion from this line and add that amount to lines 5 and 6)	$ 34,308.1
*5.	Tangible net worth	$ 23,579.4
*6.	Net worth	$ 29,524.7
*7.	Current assets	$ 24,256.0
*8.	Current liabilities	$ 22,298.5
9.	Net working capital (line 7 minus line 8)	$ 1,957.5
*10.	The sum of net income plus depreciation, depletion, and amortization	$ 10,207.5
*11.	Total assets in U.S. (required only if less than 90% of assets are located in the U.S.)	$ 50,796.0

		YES	NO
12.	Is line 5 at least $10 million?	X	
13.	Is line 5 at least 6 times line 3?	X	
14.	Is line 9 at least 6 times line 3?	X	
*15.	Are at least 90% of assets located in the U.S.? If not complete line 16.		X
16.	Is line 11 at least 6 times line 3?	X	
17.	Is line 4 divided by line 6 less than 2.0?	X	
18.	Is line 10 divided by line 4 greater than 0.1?	X	
19.	Is line 7 divided by line 8 greater than 1.5?		X

I hereby certify the wording of this letter is identical to the wording specified in 40 CFR 264.151(g) as such regulations were constituted on the date shown immediately below.

F. A. Smith
Executive Vice President
March 14, 1986

Deloitte Haskins+Sells

1114 Avenue of the Americas
New York, New York 10036
(212) 790-0500
Telex 12267

General Motors Corporation:

We have examined the consolidated balance sheet of General Motors Corporation (the "Corporation") and consolidated subsidiaries as of December 31, 1985 and the related statements of consolidated income and changes in consolidated financial position for the year then ended, and have issued our opinion thereon dated February 3, 1986. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We have not performed any auditing procedures beyond the date of our opinion on the 1985 financial statements; accordingly, this report is based on our knowledge as of that date and should be read with that understanding.

At your request, we have performed the procedures enumerated below with respect to the accompanying letter from Mr. F. A. Smith to the Regional Administrator, U.S. EPA Region V, dated March 14, 1986. It is understood that this report is solely for filing with the addressee of the accompanying letter, and is not to be used for any other purpose. The procedures that we performed are summarized as follows:

1. We compared the amounts included in items 6, 7, 8 and 11 under the caption Alternative I in the letter referred to above with the corresponding amounts in the financial statements referred to in the first paragraph.

2. We recomputed from, or reconciled to, the financial statements referred to in the first paragraph the information included in items 4, 5, 10 and 15 under the caption Alternative I in the letter referred to above.

Because the procedures referred to in the preceding paragraph were not sufficient to constitute an examination made in accordance with generally accepted auditing standards, we do not express an opinion on any of the information or amounts listed under the caption Alternative I in the aforementioned letter. In performing the procedures referred to above, however, no matters came to our attention that caused us to believe that the information or amounts included in items 4, 5, 6, 7, 8, 10, 11 and 15 should be adjusted.

Deloitte Haskins + Sells

March 14, 1986

ATTACHMENT A

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID980568745
Facility EPA I.D. Number

GMC AC SPARK PLUG DIVISION AVERILL AVE PLANT
Name of Facility

1300 N DORT HWY
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48556
City or Town	**State**	**Zip Code**

4143 DAVISON RD
Facility Location (Street, Route No. or other specific identifier)

FLINT	GENESEE	MI	48556
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $69,200.00

MID005356647
Facility EPA I.D. Number

GMC AC SPARK PLUG DIVISION DORT HWY PLANT
Name of Facility

1300 N DORT HWY
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48556
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

FLINT	GENESEE	MI	48556
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $71,100.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID980568620
Facility EPA I.D. Number

GMC AC SPARK PLUG DIVISION ENGINEERING PLANT
Name of Facility

1300 N DORT HWY
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48556
City or Town	**State**	**Zip Code**

1601 N AVERILL AVE
Facility Location (Street, Route No. or other specific identifier)

FLINT	GENESEE	MI	48556
City or Town	County	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $7,800.00

MID980568570
Facility EPA I.D. Number

GMC AC SPARK PLUG DIVISION WASTEWATER TREATMENT PLANT
Name of Facility

1300 N DORT HWY
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48556
City or Town	**State**	**Zip Code**

3026 ROBERT T LONGWAY BLVD
Facility Location (Street, Route No. or other specific identifier)

FLINT	GENESEE	MI	48556
City or Town	County	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $NA

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MI0005356712
Facility EPA I.D. Number

GMC BOC GROUP FLINT BUICK OPERATIONS*
Name of Facility

902 E HAMILTON
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48550
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	GENESEE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $78,400.00

CURRENT POST-CLOSURE COST ESTIMATE OF FACILITY $1,903,500.00

*FORMERLY: GMC BUICK MOTOR DIVISION BUILDING 85

MI098056B760
Facility EPA I.D. Number

GMC BOC GROUP OETROIT CENTRAL PLANT 37*
Name of Facility

6051 HASTINGS
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48211
City or Town	**State**	**Zip Code**

920 MILWAUKEE
Facility Location (Street, Route No. or other specific identifier)

DETROIT	WAYNE	MI	48211
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 1,400.00

*FORMERLY: GMC FISHER BODY DIVISION CENTRAL PLANT 37

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356704
Facility EPA I.D. Number

GMC BOC GROUP DETROIT CLARK AVE PLANT*
Name of Facility

2860 CLARK ST
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48232
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 39,500.00

*FORMERLY: GMC CADILLAC MOTOR CAR DIVISION CLARK PLANT

MI0980795488
Facility EPA I.D. Number

GMC BOC GROUP HAMTRAMCK PLANT*
Name of Facility

2500 E GRAND BLVD
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48211
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 130,000.00

*FORMERLY: GMC GM ASSEMBLY DIVISION HAMTRAMCK PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID000718544
Facility EPA I.D. Number

GMC BOC GROUP LAKE ORION PLANT*
Name of Facility

PO BOX 347
Facility Mailing Address (Street or P.O. Box)

LAKE ORION	MI	48035
City or Town	**State**	**Zip Code**

4555 GIDDINGS RD
Facility Location (Street, Route No. or other specific identifier)

LAKE ORION	OAKLAND	MI	48055
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 113,900.00

*FORMERLY: GMC GM ASSEMBLY DIVISION LAKE ORION PLANT

Ohio EPA 02-78-0356

OHD020632998
Facility EPA I.D. Number

GMC BOC GROUP LORDSTOWN ASSEMBLY PLANT*
Name of Facility

PO BOX 1406
Facility Mailing Address (Street or P.O. Box)

WARREN	OH	44482
City or Town	**State**	**Zip Code**

2300 HALLOCK-YOUND RD
Facility Location (Street, Route No. or other specific identifier)

LORDSTOWN	TRUMBULL	OH	44482
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 531,800.00

*FORMERLY: GMC GM ASSEMBLY DIVISION LORDSTOWN PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 02-78-0611

OHD083321091

Facility EPA I.D. Number

GMC BOC GROUP LORDSTOWN PRESSED METAL PLANT*

Name of Facility

PO BOX 1427

Facility Mailing Address (Street or P.O. Box)

WARREN	OH	44482
City or Town	**State**	**Zip Code**

2369 ELLSWDRTH-BAILEY RD

Facility Location (Street, Route No. or other specific identifier)

LORDSTOWN	TRUMBULL	OH	44482
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 7,200.00

*FORMERLY: GMC FISHER BODY DIVISION LORDSTOWN PLANT

MID005356894

Facility EPA I.D. Number

GMC BOC GROUP LANSING OLDSMOBILE PLANT 1*

Name of Facility

920 TOWNSEND ST

Facility Mailing Address (Street or P.O. Box)

LANSING	MI	4B921
City or Town	**State**	**Zip Code**

SAME AS ABOVE

Facility Location (Street, Route No. or other specific identifier)

	INGHAM		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 37,500.00

*FORMERLY: GMC OLDSMOBILE DIVISION PLANT 1

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID980700827
Facility EPA I.D. Number

GMC BOC GROUP OLDSMOBILE PLANTS 2 & 3*
Name of Facility

920 TOWNSEND ST
Facility Mailing Address (Street or P.O. Box)

LANSING	MI	48921
City or Town	**State**	**Zip Code**

W SAGINAW ST
Facility Location (Street, Route No. or other specific identifier)

LANSING	INGHAM	MI	48917
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 1,125,700.00

*FORMERLY: GMC OLDSMOBILE DIVISION PLANTS 2 & 3

MID980700843
Facility EPA I.D. Number

GMC BOC GROUP OLDSMOBILE PLANT 5*
Name of Facility

920 TOWNSEND ST
Facility Mailing Address (Street or P.O. Box)

LANSING	MI	48921
City or Town	**State**	**Zip Code**

CANAL RD
Facility Location (Street, Route No. or other specific identifier)

LANSING	EATON	MI	48917
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 63,400.00

*FORMERLY: GMC OLDSMOBILE DIVISION PLANT 5

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356795
Facility EPA I.D. Number

GMC BOC GROUP WILLOW RUN PLANT*
Name of Facility

2625 TYLER RD
Facility Mailing Address (Street or P.O. Box)

YPSILANTI	MI	48197
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WASHTENAW		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 100,000.00

*FORMERLY: GMC GM ASSEMBLY DIVISION WILLOW RUN PLANT

Ohio Epa 03-20-0221
OHD005050273
Facility EPA I.D. Number

GMC CENTRAL FOUNDRY DIVISION DEFINACE PLANT
Name of Facility

PO BOX 70
Facility Mailing Address (Street or P.O. Box)

DEFIANCE	OH	43512
City or Town	**State**	**Zip Code**

STATE ROUTE 281 EAST
Facility Location (Street, Route No. or other specific identifier)

DEFIANCE	DEFIANCE	OH	43512
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 428,500.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID041793340
Facility EPA I.D. Number

GMC CENTRAL FOUNDRY DIVISION GREY & NODULAR IRON CASTING PLANTS*
Name of Facility

2100 VETERANS MEMORIAL PARKWAY
Facility Mailing Address (Street or P.O. Box)

SAGINAW	MI	48601
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	SAGINAW		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 15,700.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION SAGINAW CASTING & PARTS PLANT
GMC CHEVROLET MOTOR DIVISION SAGINAW PARTS PLANT CLOSED 10/1/83

MID005356696
Facility EPA I.D. Number

GMC CENTRAL FOUNDRY DIVISION SAGINAW MALLEABLE IRON PLANT
Name of Facility

77 W CENTER ST
Facility Mailing Address (Street or P.O. Box)

SAGINAW	MI	48605
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	SAGINAW		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 50,300.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356688
Facility EPA I.D. Number

GMC CPC GROUP BAY CITY PLANT*
Name of Facility

100 FITZGERALD ST
Facility Mailing Address (Street or P.O. Box)

BAY CITY	MI	48707
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	BAY		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 11,500.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION BAY CITY PLANT

Ohio EPA 05-31-0441

OHD004260089
Facility EPA I.D. Number

GMC CPC GROUP NORWOOD PLANT*
Name of Facility

4726 SMITH RD
Facility Mailing Address (Street or P.O. Box)

NORWOOD	OH	46212
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	HAMILTON		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 232,400.00

*FORMERLY: GMC GM ASSEMBLY DIVISION NORWOOD PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 02-18-0114

OHD086663101
Facility EPA I.D. Number

GMC CPC GROUP PARMA PLANT*
Name of Facility

PO BOX 6436
Facility Mailing Address (Street or P.O. Box)

CLEVELAND	OH	44101
City or Town	**State**	**Zip Code**

5400 CHEVROLET BOULEVARD
Facility Location (Street, Route No. or other specific identifier)

PARMA	CUYAHOGA	OH	44130
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 3,400.00

*FORMERLY: GMC CHEVRDLET MDTOR DIVISION PARMA PLANT

MID005356886
Facility EPA I.D. Number

GMC CPC GROUP PONTIAC PLANT*
Name of Facility

1 PONTIAC PLAZA
Facility Mailing Address (Street or P.O. Box)

PONTIAC	MI	48053
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	DAKLAND		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 44,000.00

*FORMERLY: GMC PONTIAC MDTDR DIVISIDN PONTIAC PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356910
Facility EPA I.D. Number

GMC CPC GROUP PONTIAC FIERO PLANT*
Name of Facility

900 BALDWIN AVE
Facility Mailing Address (Street or P.O. Box)

PONTIAC	MI	48055
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	OAKLAND		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 20,700.00

*FORMERLY: GMC PONTIAC MOTOR DIVISION P-CAR PLANT

MID000809905
Facility EPA I.D. Number

GMC CPC GROUP ROMULUS PLANT*
Name of Facility

36880 ECORSE RD
Facility Mailing Address (Street or P.O. Box)

ROMULUS	MI	48174
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 37,200.00

*FORMERLY: DETROIT DIESEL ALLISON ROMULUS PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 05-57-0115

OHD980569388
Facility EPA I.D. Number

GMC DETROIT DIESEL ALLISON DIVISION MORAINE ENGINE PLANT*
Name of Facility

PO BOX 1291
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

4100 SPRINGBORO PIKE
Facility Location (Street, Route No. or other specific identifier)

MORAINE	MONTGOMERY	OH	45439
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 85,000.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION MORAINE ENGINE PLANT

MID005356803
Facility EPA I.D. Number

GMC DETROIT DIESEL ALLISON DIVISION REDFORD PLANT
Name of Facility

13400 W OUTER DRIVE
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48239
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 45,300.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 05-57-0273

OHD045557766
Facility EPA I.D. Number

GMC DELCO MORAINE DIVISION DAYTON NORTH PLANT
Name of Facility

1420 WISCONSIN BLVD
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
DAYTON	OH	45401

3100 NEEDMORE RD
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
DAYTON	MONTGOMERY	OH	45414

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 74,000.00

Ohio EPA 05-57-0274

OHD060928561
Facility EPA I.D. Number

GMC DELCO MORAINE DIVISION DAYTON SOUTH PLANT
Name of Facility

1420 WISCONSIN BLVD
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
DAYTON	OH	45401

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
	MONTGOMERY		

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 75,400.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356845
Facility EPA I.D. Number

GMC DELCO MORAINE SAGINAW PLANT*
Name of Facility

2328 E GENESEE AVE
Facility Mailing Address (Street or P.O. Box)

SAGINAW	MI	48603
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	SAGINAW		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 22,900.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION SAGINAW PLANT

Ohio EPA 05-57-0405

OHD004255410
Facility EPA I.D. Number

GMC DELCO PRODUCTS DIVISION KETTERING PLANTS
Name of Facility

PO BOX 1042
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

2000 FORRER BLVD
Facility Location (Street, Route No. or other specific identifier)

DAYTON	MONTGOMERY	OH	45420
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 80,400.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356621
Facility EPA I.D. Number

GMC DELCO PRODUCTS DIVISION LIVONIA PLANT*
Name of Facility

13000 ECKLES RD
Facility Mailing Address (Street or P.O. Box)

LIVONIA	MI	48151
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 98,700.00

*FORMERLY: GMC CHEVROLET MOTR DIVISION LIVONIA PLANT
GMC CPC GROUP LIVONIA PLANT
Ohio EPA 01-25-0440

OHD004294419
Facility EPA I.D. Number

GMC FISHER GUIDE DIVISION COLUMBUS PLANT*
Name of Facility

2000 GEORGESVILLE RD
Facility Mailing Address (Street or P.O. Box)

COLUMBUS	OH	43228
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	FRANKLIN		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 18,800.00

*FORMERLY: GMC FISHER BODY DIVISION COLUMBUS PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356787
Facility EPA I.D. Number

GMC FISHER GUIDE DIVISION DETROIT PLANT*
Name of Facility

6307 W FORT ST
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
DETROIT	MI	48209

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
	WAYNE		

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 13,800.00

*FORMERLY: GMC FISHER BODY DIVISION FORT ST PLANT

Ohio EPA 02-47-0192

OHD004201091
Facility EPA I.D. Number

GMC FISHER GUIDE DIVISION ELYRIA PLANT*
Name of Facility

PO BOX 4025
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
ELYRIA	OH	44036

1400 LOWELL ST
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
ELYRIA	LORAIN	OH	44036

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 2,798,000.00

*FORMERLY: FISHER BODY DIVISION ELYRIA PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356654
Facility EPA I.D. Number

GMC FISHER GUIDE DIVISION FLINT MFG. PLANTS*
Name of Facility

300 N CHEVROLET AVE
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48555
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	GENESEE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 64,800.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION FLINT MFG. PLANTS
GMC CPC GROUP FLINT MFG PLANTS

MID005356860
Facility EPA I.D. Number

GMC FISHER GUIDE DIVISION FLINT PLANT*
Name of Facility

1245 E COLDWATER RD
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48559
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	GENESEE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 3,311,600.00

*FORMERLY: GMC FISHER BODY DIVISION COLDWATER RD PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID064169154
Facility EPA I.D. Number

GMC GENERAL MOTORS TECHNICAL CENTER
Name of Facility

30800 MOUND RD SERVICE SECTION
Facility Mailing Address (Street or P.O. Box)

WARREN	MI	48090
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	MACOMB		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 154,500.00

OHD045719895
Facility EPA I.D. Number

GMC GM WAREHOUSING & DISTRIBUTION DIVISION CLEVELAND PLANT
Name of Facility

6060 W BRISTOL RD
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48554
City or Town	**State**	**Zip Code**

12990 SNOW RD
Facility Location (Street, Route No. or other specific identifier)

PARMA	CUYAHOGA	OH	44130
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 3,900.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID003912920
Facility EPA I.D. Number

GMC GM WAREHOUSING & DISTRIBUTION DIVISIDN DRAYTON PLAINS PLANT
Name of Facility

6060 W BRISTOL RD
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	4B554
City or Town	**State**	**Zip Code**

5260 WILLIAMS LAKE RD
Facility Location (Street, Route No. or other specific identifier)

DRAYTON PLAINS	OAKLAND	MI	48020
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 62,200.00

MID003906773
Facility EPA I.D. Number

GMC GM WAREHDUSING & DISTRIBUTION DIVISION FLINT PLANT
Name of Facility

6060 W BRISTDL RD
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48554
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	GENESEE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLCSURE COST ESTIMATE OF FACILITY $ 612,100.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 05-57-0256

OHD017958604
Facility EPA I.D. Number

GMC HARRISON RADIATOR DIVISION DAYTON PLANT
Name of Facility

PO BOX 824
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

300 TAYLOR ST
Facility Location (Street, Route No. or other specific identifier)

DAYTON	MONGOMERY	OH	45401
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 33,600.00

Ohio EPA 05-57-0272

OHD000817577
Facility EPA I.D. Number

GMC HARRISON RADIATOR DIVISION MORAINE PLANT
Name of Facility

PO BOX 824
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

360D DRYDEN RD
Facility Location (Street, Route No. or other specific identifier)

MORAINE	MONTGOMERY	OH	44439
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 250,700.00

CURRENT POST-CLOSURE COST ESTIMATE OF FACILITY $ 3,900,000.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID000724740
Facility EPA I.D. Number

GMC HYDRA-MATIC DIVISION CONSTANTINE PLANT
Name of Facility

ONE HYDRA-MATIC DR
Facility Mailing Address (Street or P.O. Box)

THREE RIVERS	MI	49093
City or Town	**State**	**Zip Code**

INDUSTRIAL PARK
Facility Location (Street, Route No. or other specific identifier)

CONSTANTINE	ST JOSEPH	MI	49042
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 47,000.00

MID000718551
Facility EPA I.D. Number

GMC HYDRA-MATIC DIVISION THREE RIVERS PLANT
Name of Facility

ONE HYDRA-MATIC DR
Facility Mailing Address (Street or P.O. Box)

THREE RIVERS	MI	49093
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	ST JOSEPH		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 17,000.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID270012560
Facility EPA I.D. Number

GMC HYDRA-MATIC DIVISION YPSILANTI PLANT
Name of Facility

WILLOW RUN
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
YPSILANTI	MI	48197

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
	WASHTENAW		

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 14,300.00

MID084571256
Facility EPA I.D. Number

GMC INLAND DIVISION ADRIAN PLANT*
Name of Facility

1450 E BEECHER ST
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
ADRIAN	MI	49221

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
	LENAWEE		

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 23,100.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION ADRIAN PLANT
GMC CPC GROUP ADRIAN PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 05-57-0317

OHD000817023
Facility EPA I.D. Number

GMC INLAND DIVISION DAYTON PLANT
Name of Facility

PO BOX 1224
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

2701 HOME AVE
Facility Location (Street, Route No. or other specific identifier)

DAYTDN	MONTGOMERY	OH	45417
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 42,200.00

Ohio EPA 02-18-0260

OHD097622336
Facility EPA I.D. Number

GMC INLAND DIVISION EUCLID PLANT*
Name of Facility

20001 EUCLID AVE
Facility Mailing Address (Street or P.O. Box)

CLEVELAND	OH	44117
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	CUYAHOGA		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 32,900.00

*FORMERLY: GMC FISHER BODY DIVISION EUCLID PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 05-57-0316

OHD052151701
Facility EPA I.D. Number

GMC INLAND DIVISION VANDALIA PLANT
Name of Facility

PO BOX 1224
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

480 N DIXIE DR
Facility Location (Street, Route No. or other specific identifier)

VANDALIA	MONTGOMERY	OH	45337
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 54,400.00

MID020105565
Facility EPA I.D. Number

GMC NEW DEPARTURE-HYATT BEARINGS DIVISION DETROIT PLANT*
Name of Facility

8435 ST AUBIN
Facility Mailing Address (Street or P.O. Box)

DETRDIT	MI	48212
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 25,000.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION DETROIT FORGE PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 03-22-0464

OHD001880442
Facility EPA I.D. Number

GMC NEW DEPARTURE-HYATT BEARINGS DIVISION SANDUSKY PLANT
Name of Facility

2509 HAYES AVE
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
SANDUSKY	OH	44870

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
	ERIE		

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 389,200.00

Ohio EPA 02-78-0123

OHD018414292
Facility EPA I.D. Number

GMC PACKARD ELECTRIC DIVISION WARREN CITY PLANT
Name of Facility

PO BOX 431
Facility Mailing Address (Street or P.O. Box)

City or Town	State	Zip Code
WARREN	OH	44486

408 DANA ST
Facility Location (Street, Route No. or other specific identifier)

City or Town	County	State	Zip Code
WARREN	TRUMBULL	OH	44482

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 14,400.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

Ohio EPA 02-78-0124
OHD000817346
Facility EPA I.D. Number

GMC PACKARD ELECTRIC DIVISION NORTH RIVER RDAD PLANTS
Name of Facility

PO BOX 431
Facility Mailing Address (Street or P.O. Box)

WARREN	OH	44486
City or Town	**State**	**Zip Code**

N RIVER RD AT LARCHMONT
Facility Location (Street, Route No. or other specific identifier)

WARREN	TRUMBULL	OH	44484
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 147,700.00

MID082220757
Facility EPA I.D. Number

GMC PROVING GROUND MILFORD
Name of Facility

HICKORY RIDGE & GM ROAD
Facility Mailing Address (Street or P.O. Box)

MILFORD	MI	48D42
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	OAKLAND		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 7,400.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID017079625
Facility EPA I.D. Number

GMC ROCHESTER PRODUCTS DIVISION GRAND RAPIDS PLANT*
Name of Facility

2100 BURLINGAME
Facility Mailing Address (Street or P.O. Box)

GRAND RAPIDS	MI	49501
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	KENT		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 46,400.00

*FORMERLY: GMC DIESEL EQUIPMENT DIVISION GRAND RAPIDS PLANT

MID000721738
Facility EPA I.D. Number

GMC ROCHESTER PRODUCTS DIVISION COOPERSVILLE PLANT*
Name of Facility

2100 BURLINGAME
Facility Mailing Address (Street or P.O. Box)

GRAND RAPIDS	MI	49501
City or Town	**State**	**Zip Code**

999 RANDALL
Facility Location (Street, Route No. or other specific identifier)

COOPERSVILLE	OTTAWA	MI	49404
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 1,400.00

*FORMERLY: GMC DIESEL EQUIPMENT DIVISION COOPERSVILLE PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID086744802
Facility EPA I.D. Number

GMC SAGINAW DIVISION DETROIT PLANT*
Name of Facility

1840 HOLBROOK
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48212
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 116,200.00

FORMERLY: GMC CHEVROLET MOTOR DIVISION DETROIT GEAR & AXLE PLANT
GMC SAGINAW STEERING GEAR DIVISION DETROIT PLANT

Ohio EPA 05-57-0116

OHD041063074
Facility EPA I.D. Number

GMC TRUCK & BUS MANUFACTURING GROUP MORAINE ASSEMBLY PLANT*
Name of Facility

PO BOX 1291
Facility Mailing Address (Street or P.O. Box)

DAYTON	OH	45401
City or Town	**State**	**Zip Code**

2601 W STROOP
Facility Location (Street, Route No. or other specific identifier)

DAYTON	MONTGOMERY	OH	45439
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 265,900.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION MORAINE ASSEMBLY PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID076380583
Facility EPA I.D. Number

GMC TRUCK & BUS OPERATIONS DETRDIT ASSEMBLY
Name of Facility

601 PIQUETTE
Facility Mailing Address (Street or P.O. Box)

DETROIT	MI	48202
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WAYNE		48202
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 4,500.00

MID005356951
Facility EPA I.D. Number

GMC TRUCK & BUS DPERATIONS VAN SLYKE COMPLEX PLANTS*
Name of Facility

G 3248 VAN SLYKE RD
Facility Mailing Address (Street or P.O. Box)

FLINT	MI	48552
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	GENESEE		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 250,000.00

*FORMERLY: GMC CHEVROLET MOTOR DIVISION PLANT VAN SLYKE COMPLEX PLANTS
GMC CHEVROLET MOTOR DIVISION METAL FAB PLANT
GMC CHEVROLET MOTOR DIVISION V8 ENGINE PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION V

MID005356902
Facility EPA I.D. Number

GMC TRUCK & BUS OPERATIONS PONTIAC EAST & CENTRAL PLANTS*
Name of Facility

660 S BLVD E
Facility Mailing Address (Street or P.O. Box)

PONTIAC	MI	48053
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	OAKLAND		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 338,400.00

*FORMERLY: GMC TRUCK & COACH DIVISION PONTIAC EAST PLANT

MID980568836
Facility EPA I.D. Number

GMC TRUCK & BUS OPERATIONS PONTIAC WEST ASSEMBLY PLANT*
Name of Facility

660 S BLVD E
Facility Mailing Address (Street or P.O. Box)

PONTIAC	MI	48053
City or Town	**State**	**Zip Code**

275 FRANKLIN RD
Facility Location (Street, Route No. or other specific identifier)

PONTIAC	OAKLAND	MI	48053
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 33,100.00

*FORMERLY: GMC TRUCK & COACH DIVISION PONTIAC EAST PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION VII

IAD000686899
Facility EPA I.D. Number

GMC ROCHESTER PRODUCTS DIVISION SIOUX CITY PLANT
Name of Facility

1805 ZENITH DR
Facility Mailing Address (Street or P.O. Box)

SIOUX CITY	IA	51103
City or Town	**State**	**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	WOODBURY		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 10,200.00

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION IX

CAD008295719
Facility EPA I.D. Number

GMC CPC GROUP SOUTHGATE PLANT*
Name of Facility

2700 TWEEDY BLVD
Facility Mailing Address (Street or P.O. Box)

SOUTHGATE	CA		90280
City or Town	**State**		**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	LOS ANGELES		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 118,100.00

*FORMERLY: GMC GM ASSEMBLY DIVISION SOUTHGATE PLANT

CAD000051458
Facility EPA I.D. Number

GMC CPC GROUP VAN NUYS PLANT*
Name of Facility

8000 VAN NUYS PLANT*
Facility Mailing Address (Street or P.O. Box)

VAN NUYS	CA		91409
City or Town	**State**		**Zip Code**

SAME AS ABOVE
Facility Location (Street, Route No. or other specific identifier)

	LOS ANGELES		
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 141,700.00

*FORMERLY: GMC GM ASSEMBLY DIVISION VAN NUYS PLANT

GENERAL MOTORS CORPORATION FACILITIES - U.S. EPA REGION IX

CAD009305848
Facility EPA I.D. Number

GMC DEFENSE OPS & PWR PROD GROUP SANTA BARBARA PLANT*
Name of Facility

700 E FIRMIN ST
Facility Mailing Address (Street or P.O. Box)

KOKOMO	IN	46902
City or Town	**State**	**Zip Code**

6767 HOLLISTER AVE
Facility Location (Street, Route No. or other specific identifier)

GOLETA	SANTA BARBARA	CA	93017
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 15,100.00

*FORMERLY: GMC DELCO ELECTRONICS DIVISION SANTA BARBARA PLANT

CAD008323396
Facility EPA I.D. Number

GMC DELCO-REMY DIVISION ANAHEIM PLANT
Name of Facility

PO BOX 3190
Facility Mailing Address (Street or P.O. Box)

ANAHEIM	CA	92803
City or Town	**State**	**Zip Code**

1201 MAGNOLIA AVE
Facility Location (Street, Route No. or other specific identifier)

ANAHEIM	ORANGE	CA	92801
City or Town	**County**	**State**	**Zip Code**

CURRENT CLOSURE COST ESTIMATE OF FACILITY $ 13,900.00

NOTE 16. (concluded)

(Dollars in Millions)	1985
Profits as Defined in the Plans	
Net Income in the U.S.	$3,624.3
Add (Deduct): Net income of excluded subsidiaries and associates	(45.3)
Income taxes of U.S. operations	1,275.1
Provision for the General Motors Incentive Program applicable to U.S. operations	239.0
Profit sharing accrual	180.3
Profits as defined in the Plans	$5,273.4

Profit Sharing Accrual			
Profits as defined in the Plans	$5,273.4		
Deduct Minimum Annual Return as defined in the Plans	3,202.2		
Profits in excess of Minimum Annual Return	$2,071.2	X 10% =	$ 207.1
Deduct:			
Diversion for Guaranteed Income Stream Benefit Program and Income Protection Plan	$ 20.1		
Portion of profit sharing allocable to non-participating employes	6.7		26.8
Profit Sharing Accrual			$ 180.3

NOTE 17. Contingent Liabilities

There are serious potential liabilities under government regulations pertaining primarily to environmental, fuel economy and safety matters, but the ultimate liability under these regulations is not expected to have a material adverse effect on the Corporation's consolidated financial position. There are also various claims and pending actions against the Corporation and its subsidiaries with respect to commercial matters, including warranties and product liability, civil rights, antitrust, patent matters, taxes and other matters arising out of the conduct of the business. Certain of these actions purport to be class actions, seeking damages in very large amounts. The amounts of liability on these claims and actions at December 31, 1985 were not determinable but, in the opinion of the management, the ultimate liability resulting should not have a material adverse effect on the Corporation's consolidated financial position.

ACCOUNTANTS' REPORT

1114 Avenue of the Americas
New York, New York 10036

Deloitte Haskins+Sells
CERTIFIED PUBLIC ACCOUNTANTS

General Motors Corporation, its Directors and Stockholders: February 3, 1986

We have examined the Consolidated Balance Sheet of General Motors Corporation and consolidated subsidiaries as of December 31, 1985 and 1984 and the related Statements of Consolidated Income and Changes in Consolidated Financial Position for each of the three years in the period ended December 31, 1985. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the companies at December 31, 1985 and 1984 and the results of their operations and the changes in their financial position for each of the three years in the period ended December 31, 1985, in conformity with generally accepted accounting principles applied on a consistent basis.

Deloitte Haskins + Sells

A.4.6

ATEC® Environmental Services

A Division of Atec Associates, Inc.

Environmental Engineering and Analytical Services

FINAL REPORT
SITE EVALUATION RESULTS
GM-CPC NORWOOD PLANT
NORWOOD, OHIO
ATEC PROJECT NUMBER 21-87035

Prepared For:

MR. WILLIAM STANLEY
GM-CPC NORWOOD PLANT
4726 SMITH ROAD
P.O. BOX 12121
NORWOOD, OH 45212

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
5150 East 65th Street
Indianapolis, Indiana 46220-4871
(317) 849-4990, FAX # (317) 849-4278

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

May 18, 1988

Mr. William Stanley
GM-CPC Norwood Plant
4726 Smith Road
P.O. Box 12121
Norwood, OH 45212

Re: Final Report
Site Evaluation Results
GM-CPC Norwood Plant
Norwood, Ohio
ATEC Project Number 21-87035

Dear Mr. Stanley:

ATEC Environmental Consultants (ATEC) has completed the site evaluation program described in our January 28, 1988 Site Evaluation Plan and our subsequent March and April status reports. This report serves to document the results of this program and establishes decontamination levels for clean closure consistent with the U.S. EPA guidance as noted in the March 19, 1987 Federal Register. We trust this information is receptive to your needs. Please feel free to contact us if you have any questions or comments.

Very truly yours,

ATEC Associates, Inc.

Daniel Pratter

Daniel Pratter
Staff Hydrogeologist

Geoffrey A. Glanders

Geoffrey A. Glanders
Project Hydrogeologist

TABLE OF CONTENTS

FINAL REPORT

SITE EVALUATION RESULTS

GM-CPC Norwood Plant
Norwood, Ohio
ATEC Project Number 21-87035

1.0 INTRODUCTION

ATEC Environmental Consultants (ATEC) has completed implementation of a site evaluation program at the General Motors Corporation Chevrolet Pontiac Canada Group (GM) assembly plant in Norwood, Ohio. The objectives of this program were to evaluate the subsurface conditions at various hazardous waste management units and to use the information generated by this evaluation to establish levels for subsurface decontamination.

The general scope of these work efforts were outlined in ATEC's site evaluation plan issued January 28, 1988 to the Ohio Environmental Protection Agency (OEPA). These work efforts were modified slightly in response to OEPA comments to the site evaluation plan which were received after subsurface sampling activities were completed. The basic modifications involved performing some additional laboratory analyses on soil samples collected from certain areas and basing decontamination levels either on on-site background levels or on limits established by the United Sstates Environmental Protection Agency (U.S. EPA) for ingestion or dermal contact. By using these limits as the basis for decontamination levels the need for receptor inventories and the proposed contaminant fate and transport nomograph model was eliminated.

The hazardous waste management units at the site consist predominantly of underground storage tanks which are scheduled to be removed as a part of closure. This site evaluation project was undertaken in an effort to evaluate the subsurface conditions prior to tank removal so that, in the event leakage or spillage from tank operations had occurred, these conditions could be properly anticipated prior to initiation of removal activities. The OEPA unilaterally modified the closure plan by requiring that contaminated subsoils encountered during closure be removed until remaining subsoils are at background levels. GM is concerned with this OEPA modification requiring the use of background levels to establish decontamination standards for closure, since this modification conflicts with U.S. EPA policy. This policy is provided in the March 19, 1987 Federal Register which indicates that, in appropriate circumstances, some hazardous constituents may be left in-place at the time of closure, if it can be demonstrated that such constituents do not pose a threat to human health or the environment. ATEC used this policy to establish decontamination standards for closure of the Norwood facility and this report documents the procedures undertaken to demonstrate that these standards are appropriate for this site.

The results of the evaluation program and background sampling are presented in this report. The background sample locations were submitted to OEPA in the January 28, 1988 site evaluation plan which described the scope of site evaluation activities. Having received no objections to these background sample locations, background levels have been established in accordance with the January 28, 1988 plan.

Testing of the subsoils in the vicinity of the underground storage tanks was conducted so that, if leakage or spillage was encountered during the subsurface evaluations, decontamination levels could be established prior to tank removal. Evaluation of the subsurface conditions and development of a method for establishing decontamination levels prior to the initiation of tank closure activities eliminated the inherent safety hazards associated with leaving a tank pit excavation open while these issues were pending. The subsurface sampling and analysis was not extended to the hazardous waste drum storage area since the safety hazards associated with an open excavation do not exist with closure of this unit.

2.0 WORK PERFORMED

The soil sampling and analysis was performed in accordance with the procedures and methods outlined in the January 28, 1988 site evaluation plan, as modified pursuant to OEPA's direction. The boring locations are shown in this plan and photographic documentation showing the physical layout of the borings is provided in Appendix A. As stated in the aforementioned document, split-spoon samples were collected at 2.0 ft continuous intervals. Sample nomenclature used to denote elevations beneath the ground surface at which the sample was obtained is explained in the following table.

Table 1

Sample Identification

Sample Location	Sample I.D.	Depth, ft
B-1 through B-12	- A	0.0 - 2.0
B-1 through B-12	- B	2.0 - 4.0
B-1 through B-12	- C	4.0 - 6.0
B-1 through B-12	- D	6.0 - 8.0
B-1 through B-12	- E	8.0 - 10.0
B-1 through B-12	- F	10.0 - 12.0
B-1 through B-12	- G	12.0 - 14.0
B-1 through B-12	- H	14.0 - 16.0
B-1 through B-12	- I	16.0 - 18.0
B-1 through B-12	- J	18.0 - 20.0
B-1 through B-12	- K	20.0 - 22.0

Each boring was advanced to a depth of 5 ft beneath the bottom elevation of the respective underground storage tank (UST). The depths of the tanks and borings, as well as, the depth of the samples selected for laboratory analyses are summarized in Table 2.

Table 2

Boring Depth and Sample Selection Chart

Tank Pit and Depth		Boring Number	Boring Depth, ft	Selected Sample for Analysis
No. 1	16.0 ft	B-1	22.0	E,G,H
		B-2	22.0	E,G,H
		B-3	22.0	E,G,H
		B-4	22.0	E,G,H
No. 2	17.5 ft	B-5	22.0	H,I,J
		B-6	22.0	F,G,H
		B-7*	20.0	E,H,I
		B-8	20.0	F,H,I
No. 3	15.0 ft	B-9*	14.0	E,F,G
		B-10*	12.0	E,G
		B-11	18.0	F,G,H
		B-12	18.0	F,G,H

*Located approximately 5 ft lower in elevation than the tank pit.

Tank Pit No.3 Boring Nos. 9 and 10 were terminated at a shallower depth than Boring Nos. 11 and 12, because of a change in the ground surface elevation between the tank farm and inside the Main Assembly Plant where Borings 9 and 10 were located.

Boring logs depicting the subsurface conditions at each location are provided in Appendix B of this report. In addition to the subsurface conditions, visual observations and total photoionizable vapor (TPV) emissions results are also recorded on the logs. The TPVs recorded during this investigation ranged from non-detectable levels in the majority of the samples to slightly higher than background levels. These detectable levels are believed to be caused by remnants of the wash solvent used in the decontamination procedure. Three samples were noted as having elevated TPVs. B1-A, B2-E and B8-F were all submitted for volatile organic priority pollutant compound (VOC) analysis, however these field measurements were not substantiated by laboratory testing.

In conjunction with the twelve tank pit borings, four additional borings were drilled to establish background soil conditions. The background soil borings are identified as MW-2, MW-3, MW-9 and MW-10 on the boring logs. These borings correspond with the background soil borings B-2, B-3, B-4 and B-1, respectively, as stated in the Site Evaluation Plan.

Split-spoon samples from background borings were collected at 5 ft intervals to a depth of 15 ft. Sample nomenclature differs in these background borings from the tank pit borings. Sample "A" is from 3.5 to 5.0 ft beneath the ground surface, Sample "B" is from 8.5 to 10.0 ft, Sample "C" was obtained from 13.5 to 15.0 ft beneath the ground surface.

3.0 LABORATORY TEST RESULTS

The soil analyses were performed in accordance with the site evaluation plan and summarized in Table 3.

Table 3

Sample Analysis Summary

Tank Content	Boring Identification	Analysis
Chlorinated Waste, Spent Paint Thinner Tank Pit No. 1)	B-1, B-2, B-3, B-4	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Total Cyanide, Volatile Organics, pH
Paint Waste (Tank Pit No. 2)	B-5, B-6, B-7, B-8	Arsenic, Barium, Chromium, Lead, Volatile Organics, pH
Spent Paint Thinner (Tank Pit No. 3)	B-9, B-10, B-11, B-12	Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Volatile Organics

Samples obtained from Tank Pit No. 2 borings were also analyzed for cadmium and lead in accordance to the OEPA Evaluation Plan Comments. The analytical data generated from this investigation is provided in Appendix C.

All analyses for this project were performed in strict adherence to the techniques described in the U.S. EPA document "Test Methods for Evaluating Solid Waste-Physical/Chemical Methods", 3rd Edition (SW 846). A summary of the methods utilized is provided in Table 4.

Table 4

Summary of U.S. EPA Test Methods

Parameter	Preparation Method	Analytical Method
Arsenic	3010	7061
Barium	3010	7080
Cadmium	3010	7130/7131
Chromium	3010	7190
Lead	3010	7420
Mercury	3010	7470
Total Cyanide	-	9010
VOCs	3810	8240

Soil samples collected from the borings drilled around the underground tanks were also subjected to various physical tests in an effort to characterize the soil conditions adjacent to the USTs. Permeability tests were performed on eight samples. Constant-head, back-pressure saturated permeability tests were conducted in the triaxial cell on undisturbed Shelby tube samples from Borings B-1, B-2, B-3, B-5, B-7, B-8, B-11 and B-12. The triaxial cell allows for various confining pressures and hydraulic gradients to be applied to the soil specimen in order to model in-situ conditions. These tests are considered to be the current state-of-the-art procedures for obtaining reliable results for fine-grained soils of low permeability. The reference for this testing procedure is the Army Corps of Engineers' Laboratory Soils Testing Manual, 1970, Appendix VII, Method 7. A summary of the permeability tests is provided in Table 5 which indicate very low permeabilities.

Table 5

Permeability Test Results

Boring No.	Depth, ft	Permeability, cm/sec
B-1	16.0 - 18.0	4.6×10^{-8}
B-2	16.0 - 18.0	1.4×10^{-8}
B-3	16.0 - 18.0	1.2×10^{-8}
B-5	20.0 - 22.0	1.3×10^{-8}
B-7	16.0 - 18.0	2.0×10^{-8}
B-8	20.0 - 22.0	1.7×10^{-8}
B-11	16.0 - 18.0	6.5×10^{-8}
B-12	16.0 - 18.0	1.2×10^{-8}

Cation exchange capacity (CEC) tests were performed on eight samples obtained from the tank pit borings. The CEC is a measure of a soils capacity to absorb cations and is important in evaluating the ability of soils to adhere metal cations from possible contaminant sources. The CEC was determined by ammonium acetate extraction after procedures outlined in the following reference: Black, C.A., ed., 1965, Methods of Soil Analysis, Part 2, Chemical and Microbiological Properties, Agronomy Monograph No. 9, American Society of Agronomy, Madison, Wisconsin. CEC is typically expressed as milli-equivalent weights of absorbed ions per 100 grams of dry soil (meq/100g). A summary of CEC results are tabulated in Table 6. Complete laboratory data regarding the permeability tests and CEC's are provided in Appendix D.

Table 6

Cation Exchange Capacity Results

Sample I.D.	Depth, ft	CEC, meq/100g
B-1	16.0 - 18.0	12.5
B-2	16.0 - 18.0	11.3
B-3	16.0 - 18.0	10.0
B-4	16.0 - 18.0	10.2
B-5	20.0 - 22.0	9.8
B-7	18.0 - 20.0	20.0
B-8	16.0 - 18.0	10.0
B-11	16.0 - 18.0	13.3

4.0 ESTABLISHMENT OF DECONTAMINATION LEVELS

4.1 Levels Based on Ingestion Limits

Decontamination levels have been established using a technique which is consistent with the March 19, 1987 Federal Register and the Draft Clean Closure Guidance Document available from U.S. EPA Region V. These levels were established using ingestion as the most conservative route of exposure. The levels are based on the acceptable daily intake (ADI) or risk reference dose (RRfd) values as established by the U.S. EPA Health Advisory Program. These values constitute the daily exposure level which, during the entire lifetime of a human, appears to be without appreciable risk on the basis of all facts known at the time. These values were converted to decontamination levels in soils using the following equation and the following conservative assumptions:

$$\text{Decontamination Level} = \frac{(\text{ADI or RRfd})\ (\text{BW})}{(\text{IR})}$$

where ADI or RRfd expressed as mg/kg BW/day
BW = Body weight of Protected Individual (assume 17kg child)
IR = Soil Ingestion Rate (assume 1 gram/day)

Based on a review of U.S. EPA Health Advisories (HA) the ADI/RRfd and associated decontamination levels have been established as shown in Table 7. All samples revealed parameter concentrations below the established decontamination levels.

Table 7

Test Parameter	ADI/RRfd mg/kg BW/day	Decontamination Level mg/kg (ppm)
Arsenic*	0.02	340
Barium	0.05	850
Cadmium	0.0005	8.5
Chromium**	0.005	85
Mercury	0.002	34
Lead	No Specified Value	None Established
Cyanide	0.02	340

*HA indicates range from 2 to 0.02
**Value for the most toxic form of chromium (hexavalent)

4.2 Comparison with On-Site Background Levels

Since no ADI or RRfd has been specified by the U.S. EPA for lead, the above approach in establishing decontamination levels will not be applicable to this parameter. As an alternative, ATEC used the statistical approach outlined in the January 28, 1988 site evaluation plan to compare the concentrations of lead in the soil sample collected around the hazardous waste units with background levels. The results of this statistical comparison are provided in Appendix E. These results indicate that lead concentrations in soil samples collected from each tank pit are within the range of background concentrations at the 95 percent confidence interval. ATEC also compared the concentrations of all remaining inorganic constituents with background levels using this statistical technique. These comparisons are summarized in Appendix E which indicate remaining inorganic constituent concentrations are also within the range of background values at the 95 percent confidence level.

5.0 CONCLUSIONS

The analytical data generated from samples collected from around the underground storage tanks did not show the presence of detectable concentrations of volatile organic priority pollutant compounds (VOCs). Statistical comparisons between background and sample heavy metal concentrations revealed sample concentrations within the range of background concentrations at a 95 percent confidence level. Furthermore, comparisons between the heavy metal concentrations in samples collected and the decontamination levels established using guidance provided in the March 19, 1987 Federal Register reveal that no sample reported concentrations greater than the established decontamination levels.

For the reasons articulated earlier in the report, ATEC believes that the March 1987 U.S. EPA policy should be applied to the Norwood facilities being closed, especially for organic constituents. However, we also believe that closure can immediately be commenced for the underground tanks based on background levels provided OEPA agrees with the background levels established herein. Proceeding with such closure would expedite the process and avoid the necessity of an amended closure plan for the underground tanks. If OEPA concurs with this approach, ATEC proposes that the tanks be removed and samples taken from the base of the tank pit according to the procedures specified in our April 14, 1988 status report. The samples would then be analyzed for the same parameters as approved by OEPA in the site evaluation plan.

In regard to the drum storage area, the evaluation of laboratory analysis of subsurface samples taken during closure will be performed consistent with the March 1987 U.S. EPA policy procedures undertaken for the underground tanks as described herein. Subsurface samples were not taken in the site evaluation process because no safety reason existed (i.e., closure of the drum storage area will not involve site safety issues as in the case of the underground tanks with the excavated areas from the tank removal). We will provide an amended closure plan for the drum storage area if the evaluation performed pursuant to the March policy indicates that a decontamination level other than background levels is appropriate for the drum storage area.

ATEC feels that this site evaluation project will ensure that a proper closure plan for the underground tanks can now be implemented. We would be pleased to meet with you or representatives of the OEPA to discuss any aspect of this report.

APPENDIX A

SITE EVALUATION

RCRA CLOSURE
GM-CPC
NORWOOD, OHIO

Appendix A

Photographic Documentation

Appendix A

Photographic Documentation

PHOTOGRAPH NO.	LOCATION DESCRIPTION
A-1	West View of Soil Boring Locations, Tank Pit No. 1 (Chlorinated Waste, Spent Paint Thinner)
A-2	South View of Soil Boring Locations, Tank Pit No. 1
A-3	Tank Pit No. 1, Soil Borings B-2 and B-4
A-4	Tank Pit No. 1, Soil Borings B-1 and B-3
B-1	Plan View of Soil Boring Locations, Tank Pit No. 2 (Paint Waste)
B-2	Plan View of Soil Boring Locations, Tank Pit No. 2 (Paint Waste)
B-3	South View of Soil Boring Locations, Tank Pit No. 2
B-4	East View of Soil Boring Locations, Tank Pit No. 2
C-1	West View of Soil Boring Locations B-9 and B-10, Tank Pit No. 2 (Spent Paint Thinner)
C-2	East View of Soil Boring Locations B-9 and B-10, Tank Pit No. 2 (Spent Paint Thinner)
C-3	Inside North Train Well Adjacent to Tank Pit No. 3 at B-11 Boring Location
C-4	North Train Well at B-11 and B-12 Boring Locations

1

2

A

3

4

1

2

B

3

4

1

2

C

3

4

APPENDIX
B

SITE EVALUATION

RCRA CLOSURE
GM-CPC
NORWOOD, OHIO

Appendix B

Soil Borings

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-1

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Northeast Corner of Tank Pit No. 1
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 2/29/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown and black moist Silty Clayey Sand (FILL)	2.0		*A	3/4 3/3	100	2000	7" Concrete Some black stain present in Sample A
Brown moist Sandy Clay with trace wood and brick (FILL)	4.0		B	3/4 5/4	100	ND	
Brown very moist very Silty Clay with trace fine Sand (POSSIBLE FILL)		5	C	2/2 2/5	100	ND	*Sample obtained for analysis
-trace wood at 7.0'	8.0		D	3/4 6/7	100	ND	
Brown and gray mottled moist very SILTY CLAY (CL) with trace fine Sand			*E	3/4 6/8	100	ND	ST = Shelby Tube
-brown with trace blue mottled slightly moist with trace medium to coarse Sand		10	F	5/7 12/13	100	ND	
and fine Gravel below 11.0'			*G	4/8 11/14	100	ND	
		15	*H	4/9 12/15	100	ND	
			I	ST	20/24	ND	
-very moist to wet below 20.0'		20	J	6/6 12/9	50	ND	
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 20.0 FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.
Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-2

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Southwest Corner of Tank Pit No. 1
FOREMAN P. Liniville
INSPECTOR O. Pratter

JOB NO. 21-87035
START DATE 3/1/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Crushed stone and Silty fine to coarse Sand with brick (FILL)	2.0		A	2/2 4/2	25	100	8" Concrete
Dark brown slightly moist very soft Sandy Clay with Gravel (FILL)			B	1/1 1/2	25	75	
-very moist below 4.0'		5	C	1/1 1/1	100	190	
-wet below 8.0'			D	1/1 2/1	25	350	
	10.0		*E	1/2 2/1	75	370	Strong odors present from 8.0' to 15.0'
Dark gray to green very moist to wet very soft very Sandy Silty Clay with trace Silt and trace wood (POSSIBLE FILL)		10	F	1/2 1/3	100	720	
-very thin wet fine to medium Sand seam at 13.5'	15.0		*G	1/2 4/7	75	900	*Sample obtained for analysis
Brown and gray mottled moist medium stiff SANDY SILTY CLAY (CL)		15	*H	2/4 5/6	100	650	
-brown and green slightly moist hard below 18.0'			I	ST	11/24		ST = Shelby Tube
			J	7/13 24/18	100	500	
		20	K	12/15 13/16	100	300	
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 8.0 FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-3

CLIENT General Motors

PROJECT NAME RCRA Site Investigation

PROJECT LOCATION Norwood, Ohio

BORING LOCATION Northwest Corner of Tank Pit No. 1

FOREMAN P. Liniville

INSPECTOR D. Pratter

JOB NO. 21-87035

START DATE 2/29/88

BORING METHOD HSA

ROCK CORE DIA. - IN.

SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Reddish brown slightly moist Silty fine to medium Sand with trace Clay (FILL)	2.5		A	5/4 2/2	25	ND	9" Concrete
Brown to gray mottled slightly moist to moist SILTY CLAY (CL)			B	3/5 6/9	100	ND	
-2" black very moist fine to medium Sand seam at 3.5'		5	C	2/5 8/10	100	ND	
-reddish brown and gray slightly moist below 4.0' with thin light gray moist Silt seams			D	4/8 12/13	100	ND	Faint chocolate odor present
			*E	3/5 9/9	100	ND	
-reddish brown and gray mottled below 8.0'		10	F	5/7 16/23	100	ND	ST = Shelby Tube
-brown with trace blue mottled and trace medium to coarse Sand and fine Gravel below 12.0'			*G	6/19 14/16	100	ND	
		15	*H	5/9 13/16	100	ND	
			I	ST	100	22/24	
			J	4/13 24/29	100	ND	
		20	K	12/15 28/45	100	ND	*Sample obtained for analysis
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS

NOTED ON RODS None FT

AT COMPLETION Dry FT

AFTER - HRS. - FT

BORING METHODS

HSA-HOLLOW STEM AUGERS

CFA-CONT.FLIGHT AUGERS

HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments

REC %: Sample Recovery, %

(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-4

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Southwest Corner of Tank Pit No. 1
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/1/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown slightly moist loose Silty fine to coarse Sand with Gravel (FILL)			A	5/6 5/4	75	20	9" concrete
			B	5/5 4/5	100	65	
	6.0	5	C	5/4 5/3	100	125	ST = Shelby Tube
Green and brown moist medium stiff Silty Clay with trace brick and asphalt (FILL)	8.0		D	2/1 3/4	75	175	*Sample obtained for analysis
Green very moist to wet very loose very SAND CLAY (CL)			*E	3/2 1/1	100	175	
		10	F	1/1 1/2	100	175	
	13.0		*G	1/2 8/9	100	55	
Light brown slightly moist very stiff SANDY SILTY CLAY (CL) with trace loose Gravel		15	*H	5/9 10/16	100	35	
-brown and gray mottled below 13.0'			I	ST	14/24		Water present at 17.0' No Sand seam was observed
			J	5/9 19/18	100	33	
		20	K	5/8 10/10	100	35	
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 17.0 FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-5

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Northeast Corner of Tank Pit No. 2
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/1/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown and gray slightly moist medium stiff Silty Clay with trace Sand (FILL)			A	1/4 5/4	100	ND	9" Concrete
-brick and debris at 1.5' -moist and soft from 4.0' to 6.0'			B	5/4 5/5	100	ND	*Sample obtained for analysis
-medium stiff 6.0' to 8.0'		5	C	2/2 2/3	0	ND	ST = Shelby Tube
-soft 8.0' to 10.0'			D	2/2 3/4	100	ND	
	9.0		E	2/2 2/2	100	ND	
Dark green very moist soft very SILTY CLAY (CL) with very little fine Sand -green and gray mottled below 10.0'		10	F	2/4 5/6	100	ND	
-brown and gray mottled below 12.0'	14.0		G	2/8 9/10	100	ND	Samples H, I and J split-spoons were filled with water. No apparent TPVs present from sample. Water believed to be at contact of moist very Silty Clay and slightly moist hard Sandy Silty Clay at 14.0'
Brown and gray mottled slightly moist hard SANDY SILTY CLAY (CL) with trace fine Gravel		15	*H	4/9 13/18	100	ND	
-very stiff below 18.0'			*I	5/10 14/17	100	ND	
			*J	3/9 13/15	100	ND	
		20	K	ST			
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT. FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC® Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-6

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Northwest Corner of Tank Pit No. 2
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/3/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown slightly moist Gravelley fine to coarse Sand (FILL)			A	8/12 14/1	100	ND	11" Concrete
-void 3.0' and 8.0'			B	1/2 0/0	10	ND	*Sample obtained for analysis
		5	C	0/0 0/0			
			D	0/0 0/0			ST = Shelby Tube
-with trace Clay below 10.0'			E	2/2 2/1	100	ND	
		10	*F	2/2 2/1	25	ND	
			*G	4/2 3/4	25	ND	
		15	*H	2/2 1/1	25	ND	
			I	5/4 2/2	25	ND	
			J	5/4 2/2	25	ND	
		20	K	2/2 1/1	25	ND	
Bottom of Test Boring @ 20.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*) BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**) TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-7

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Southeast Corner of Tank Pit No. 2
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/3/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Dark brown and brown loose very Silty Sand with trace Gravel (FILL)	2.0		A	6/4 2/3	75	ND	9" Concrete
Light brown moist very Sandy Silt with trace Gravel (POSSIBLE FILL)			B	5/5 8/7	75	ND	
		5	C	2/4 8/6	50	ND	
			D	1/2 3/4	100	ND	
-possible green stain at 9.0'			*E	2/3 4/4	100	75	
	12.0	10	F	1/2 3/4	100	ND	Water present at 12.0' No contamination present
Brown with gray mottled slightly moist SANDY SILTY CLAY (CL)			G	3/9 11/14	100	ND	
-thin wet Clayey Sand seam at 15.5'		15	*H	6/13 17/21	100	ND	
			*I	8/9 13/22	100	ND	*Sample obtained for analysis
			J	ST	20/20	ND	ST = Shelby Tube
		20					
Bottom of Test Boring @ 20.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 12.0 FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-8

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Southwest Corner of Tank Pit No. 2
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/4/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown slightly moist Gravelly fine to coarse Sand with trace Clay (FILL)			A	9/9 10/11	75	10	*Sample obtained for analysis
			B	9/4 9/14	75	13	ST = Shelby Tube
		5	C	8/8 9/14	25	50	
	8.0		D	6/4 4/8	100	70	
Brown moist Sandy Clay with trace Gravel and green stain from 9.0' to 9.5' with trace cinders and coal (FILL)	10.1	10	E	2/4 5/5	75	70	
Brown very moist to wet Gravelly Clayey Sand (FILL)			*F	5/4 5/5	25	240	No odor present from stain at 16.0'
-wet below 14.0'			G	5/5 5/5	0		
-blue stain at 16.0'		15	*H	3/2 1/4	25	100	Heavy oil stain at 16.0' present at the bottom of Sample H
	18.0		*I	2/2 3/4	25	100	
Brown and gray mottled slightly moist to moist SANDY SILTY CLAY (CL) with trace fine Gravel			J	2/4 5/5	50	100	
		20	K	ST	24/29	100	
Bottom of Test Boring @ 22.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-9

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION East Corner of Tank Pit No. 3
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/4/88
BDRING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Dark brown slightly moist fine to coarse Sand with trace Silt and Gravel (FILL)			A	100 0.5'	100	ND	12" Concrete
-brown below 4.0'			B	30/50 D.2'	100	ND	*Sample obtained for analysis
-trace Clay from 6.0' to 10.0'		5	C	1/D 1/1	25	ND	ST = Shelby Tube
			D	3/1 2/2	100	ND	
-very moist Gravelly medium to coarse Sand with trace Silt and Clay below 10.0'		10	*E	2/2 1/2	75	ND	
-wet coarse Gravel with trace Clay below 12.0'			*F	8/11 6/5	50	ND	
			*G	3/2 3/50 0.25'	25	ND	
Bottom of Test Boring @ 14.0'		15					

WATER LEVEL OBSERVATIONS
NOTED ON RODS None FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLDWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-10

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION West Corner of Tank Pit No. 3
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-B7035
START DATE 3/4/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Voild							12" Concrete 2.5' void beneath concrete
	2.5						
Brown slightly moist Gravelly fine to coarse Sand (FILL)			B	2/3 2/4	50	ND	
-trace Clay at 5.5'		5	C	3/3 2/3	50	ND	*Sample obtained for analysis
			D	3/5 2/4	25	ND	
	10.0		*E	23/15 5/5	25	ND	ST = Shelby Tube
Brown very moist to wet very Silty Clay (FILL)		10	*F	3/3 15/12	25	ND	
-asphalt and large Gravel at 12.0'			G	50/0.25'	0		
Bottom of Test Boring @ 12.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC® Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-11

CLIENT General Motors
PROJECT NAME RCRA Site Investigation
PROJECT LOCATION Norwood, Ohio
BORING LOCATION Southwest Corner of Tank Pit No. 3
FOREMAN P. Liniville
INSPECTOR D. Pratter

JOB NO. 21-87035
START DATE 3/9/88
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown slightly moist fine Clayey Sand (FILL)	1.0		A	9/7 5/5	50	ND	*Sample obtained for analysis
Light brown slightly moist to moist very SILTY CLAY (CL) with trace Sand			B	5/7 8/9	100	ND	ST = Shelby Tube
-brown mottled with little Sand below 6.0'		5	C	3/4 5/8	100	ND	
-very moist Silt seam at 9.0' to 9.5'			D	6/7 11/12	75	ND	
	9.5		E	6/6 10/15	100	ND	
Brown slightly moist SANDY SILTY CLAY (CL) with trace fine Gravel		10	*F	9/10 14/19	100	ND	Elevations are relative to top of concrete inside the north train well
			*G	6/11 16/19	100	ND	
		15	*H	7/8 12/16	100	ND	
			I	ST	22/24	ND	
Bottom of Test Boring @ 18.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. B-12

CLIENT	General Motors	JOB NO.	21-87035
PROJECT NAME	RCRA Site Investigation	START DATE	3/10/88
PROJECT LOCATION	Norwood, Ohio	BORING METHOD	HSA
BORING LOCATION	Southeast of Tank Pit No. 3	ROCK CORE DIA.	- IN.
FOREMAN	P. Liniville	SHELBY TUBE DIA	- IN.
INSPECTOR	D. Pratter		

SOIL/ROCK DESCRIPTION Surface Elevation	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Brown moist Sandy Clay with Gravel (FILL)							2' Concrete
		5					Elevations are relative to the top of asphalt above Tank Farm No. 3
	10.0	10	E	4/5 5/6	75	ND	*Sample obtained for analysis
Brown to black mottled moist SILTY CLAY (CL) with trace Sand			*F	5/4 7/12	100	ND	ST = Shelby Tube
	14.0		*G	7/8 12/21	100	ND	
Light brown slightly moist SANDY SILTY CLAY (CL) with trace fine to medium Gravel		15	*H	5/7 11/16	100	ND	
			I	ST	24/ 29	ND	
Bottom of Test Boring @ 18.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS ____ FT
AT COMPLETION Dry FT
AFTER - HRS. - FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-2

CLIENT	C.P.C. Group, General Motors Corporation	JOB NO.	21-73223
PROJECT NAME	Site Environmental Assessment-Norwood Plant	START DATE	7/29-30/87
PROJECT LOCATION	Norwood, Ohio	BORING METHOD	HSA
BORING LOCATION	See Attached Blue Line Drawings	ROCK CORE DIA.	- IN.
FOREMAN	D. Hudson	SHELBY TUBE DIA	- IN.
INSPECTOR	M. Bramblett		

SOIL/ROCK DESCRIPTION Surface Elevation 627.44	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
0.3' Concrete							
Brown moist very dense Silty fine Gravelly fine to coarse Sand with trace Clay (FILL)			A	9/17 24/24	90	127	
		5					
	7.5						
Gray and brown mottled moist very stiff Sandy Silty Clay with trace fine Gravel -brown below 8.5' (POSSIBLE FILL)			B	9/9 1D/15	8O	13.3	
		1D					
-stiff, with trace cinders below 13.0'			C	4/3 6/7	80	11.4	
		15					
	17.0						
Brown to gray wet fine GRAVELLY fine to coarse SAND (SP) with trace Silt							Water on rods at 18.5'
	19.0						
Gray moist to very moist stiff SANDY SILTY CLAY (CL) with trace fine Gravel		2D	1	3 4/6	70	5.2	
			2	5 6/8	80	5.2	
		25	3	4 6/7	70	5.9	
-hard below 28.5'			4	3 5/1D	5D	6.3	
-moist, 1" fine Sand seams with trace organics (wood) below 29.0'		3D	5	2D 26/36	8D	4.1	
			6	23/41	1DD	5.4	
-trace wood below 33.D'							
		35	7	15 24/29	1DD	15.6	
	38.2						
Gray moist to very moist hard very fine SANDY SILT (SC) with trace Clay -fine Sand seam at 38.5' and 39.D'		4D	8	5 16/18	9D	2D.7	

WATER LEVEL OBSERVATIONS

NOTED DN RDDS 43.0 FT

AT COMPLETION 35.5 FT

AFTER ____ HRS. ____ FT

BDRING METHODS

HSA-HOLLDW STEM AUGERS

CFA-CDNT.FLIGHT AUGERS

HA-HAND AUGER

NOTES: (*)BLDWS/6 in., In Three 6 in. Increments

REC %: Sample Recovery, %

(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC® Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-2

CLIENT C.P.C. Group, General Motors Corporation

PROJECT NAME Site Environmental Assessment-Norwood Plant

PROJECT LOCATION Norwood, Ohio

BORING LOCATION See Attached Blue Line Drawings

FOREMAN D. Hudson

INSPECTOR M. Bramblett

JOB NO. 21-73223

START DATE 7/29-30/87

BORING METHOD HSA

ROCK CORE DIA. - IN.

SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation 627.44	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Gray moist to very moist hard very fine SANDY SILT (SC) with trace Clay -wet, with 1" fine Sand seam at 43.7'	46.3	45	9	12 19/16	100	19.2	Water on rods at 43.0'
Gray moist stiff SANDY SILTY CLAY (CL)	48.0		10	7 9/9	90	14.6	
Gray to brown very moist medium dense CLAYEY fine to coarse SAND (SC)	49.5						
Gray moist very stiff very fine SANDY SILT (SC)		50	11	6 10/12	90	14.4	5.0' of water on rods at 50.0'
Bottom of Test Boring @ 50.0'							

WATER LEVEL OBSERVATIONS

NOTED ON RODS 43.0 FT

AT COMPLETION 35.5 FT

AFTER ____ HRS. ____ FT

BORING METHODS

HSA-HOLLOW STEM AUGERS

CFA-CONT.FLIGHT AUGERS

HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments

REC %: Sample Recovery, %

(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC® Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-3

CLIENT C.P.C. Group, General Motors Corporation
PROJECT NAME Site Environmental Assessment-Norwood Plant
PROJECT LOCATION Norwood, Ohio
BORING LOCATION See Attached Blue Line Drawings
FOREMAN D. Hudson
INSPECTOR M. Bramblett

JOB NO. 21-73223
START DATE 8/4/87
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation 625.15	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
0.2' Asphalt, 0.5' Gravel Brown moist very loose Sand and Gravel with cinders and metal fragments (FILL)	4.5		A	2/2 2/2	80	9.7	Had to offset boring four times due to obstruction at 6.0' in three previous attempts
Brown to gray mottled moist hard SANDY SILTY CLAY with trace fine Gravel and trace cinders (FILL)	12.5	5 10	B	8/13 20/20	90	11.2	
Brown moist hard Sandy Silty Clay with trace fine Gravel and trace Limestone fragments (POSSIBLE FILL)		15	C	7/15 18/18	80	6.9	
-brown and gray mottled, very moist, very stiff below 18.5'		20	1	7 10/10	100	6.6	
-fossiliferous Limestone Gravel below 23.5'	24.3		2	12 12/14	70	5.7	
Gray moist very stiff SANDY SILTY CLAY (CL) with trace fine Gravel		25					
-hard below 28.5'		30	3	19 19/26	90	5.9	
-trace organics (wood)		35	4	12 16/18	100	6.1	
Gray wet medium dense SILTY fine to medium SAND (SM) with trace Clay	38.6	40	5	3 8/12	80	6.0	

WATER LEVEL OBSERVATIONS
NOTED ON RODS 39.0 FT
AT COMPLETION ___ FT
AFTER ___ HRS. ___ FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ĀTEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-3

CLIENT	C.P.C. Group, General Motors Corporation	JOB NO.	21-73223
PROJECT NAME	Site Environmental Assessment-Norwood Plant	START DATE	8/4/87
PROJECT LOCATION	Norwood, Ohio	BORING METHOD	HSA
BORING LOCATION	See Attached Blue Line Drawings	ROCK CORE DIA.	- IN.
FOREMAN	D. Hudson	SHELBY TUBE DIA	- IN.
INSPECTOR	M. Bramblett		

SOIL/ROCK DESCRIPTION Surface Elevation 625.15	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
Gray wet medium dense SILTY fine to medium SAND (SM) with trace Clay			6	1 3/8	100	5.8	
		45	7	1 4/8	90	6.0	
	48.6						
Gray moist very stiff SANDY SILTY CLAY (CL)		50	8	1 7/7	90	5.6	
Bottom of Test Boring @ 50.0'							

WATER LEVEL OBSERVATIONS

NOTED ON RODS 39.0 FT

AT COMPLETION ____ FT

AFTER ____ HRS. ____ FT

BORING METHODS

HSA-HOLLOW STEM AUGERS

CFA-CONT.FLIGHT AUGERS

HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments

REC %: Sample Recovery, %

(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-9

CLIENT C.P.C. Group, General Motors Corporation

PROJECT NAME Site Environmental Assessment-Norwood Plant

PROJECT LOCATION Norwood, Ohio

BORING LOCATION See Attached Blue Line Drawings

FOREMAN D. Hudson

INSPECTOR D. Combs

JOB NO. 21-73223

START DATE 7/23/87

BORING METHOD HSA

ROCK CORE DIA. - IN.

SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation 646.90	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
3" Asphalt, 6" Gravel Tan slightly moist very stiff SILTY CLAY (SC) with trace Sand			A	7/13 16/13	100	4	
		5					
			B	5/6 8/10	100	6	
		10					
-brown, moist, very stiff, with trace fine Gravel below 12.5'			C	14/19 16/14	100	3	-water on rods at 15.0'
		15					
	18.5						
Gray slightly moist hard SANDY SILTY CLAY (CL) with trace Gravel		20	1	6 12/27	100	4	
-brown, moist below 23.0'		25	2	12 20/18	100	3	-obstruction - no penetration, drilled past obstruction to 24.0'
	28.0						
Brown wet dense CLAYEY fine to medium SAND (SC) with trace Silt	29.8	30	3	11 14/28	100	5	
Gray with tan mottled moist hard SANDY SILTY CLAY (CL) with trace fine Gravel and Limestone fragments -2" wet very fine Sandy Silt seam at 34.5'		35	4	24 24/40	100	3	
Bottom of Test Boring @ 36.0'							

WATER LEVEL OBSERVATIONS

NOTED ON RODS ______ FT

AT COMPLETION ______ FT

AFTER ______ HRS. ______ FT

BORING METHODS

HSA-HOLLOW STEM AUGERS

CFA-CONT.FLIGHT AUGERS

HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments

REC %: Sample Recovery, %

(**)TPV-Total Photoionizable Vapors ppm (parts per million)

ATEC Associates, Inc.

Consulting Geotechnical / Materials Engineers, and Environmental Scientists

LOG OF BORING NO. MW-10

CLIENT C.P.C. Group, General Motors Corporation
PROJECT NAME Site Environmental Assessment-Norwood Plant
PROJECT LOCATION Norwood, Ohio
BORING LOCATION See Attached Blue Line Drawings
FOREMAN D. Hudson
INSPECTOR M. Bramblett/D. Combs

JOB NO. 21-73223
START DATE 7/24/87
BORING METHOD HSA
ROCK CORE DIA. - IN.
SHELBY TUBE DIA - IN.

SOIL/ROCK DESCRIPTION Surface Elevation 627.0	STRATUM DEPTH ft.	DEPTH ft.	SAMPLE NO.	SPT (*)	REC %	TPV ppm (**)	REMARKS
0.2' Asphalt, 0.5' Crushed Stone							
Tan slightly moist hard SANDY SILTY CLAY (CL) with trace fine Gravel			A	9/11 14/20	100	130	
-tan to gray mottled very stiff below 5.0'		5					
			B	8/8 10/10	80	10	
		10					
-very moist, Sandy Clay at 13.0' - 13.5' -Limestone fragments below 14.0'			C	10/10 12/8	100	6.0	
		15					
-gray to brown mottled, very stiff below 18.5' -gray below 19.8'		20	1	16 10/14	100	2.0	
	23.0						
Gray wet very dense GRAVELLY fine to coarse SAND (SP) with little Clay	24.2	25	2	6 12/14	80	3.6	
Gray moist very stiff SANDY SILTY CLAY (CL) with trace fine Gravel							
-hard below 28.5' -moist to very moist, very stiff below 30.0'		30	3	7 12/20	80	2.4	
-very fine Sandy Silt seam below 30.0'			4	6 12/14	90	2.3	
Bottom of Test Boring @ 32.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 23.5 FT
AT COMPLETION ____ FT
AFTER ____ HRS. ____ FT

BORING METHODS
HSA-HOLLOW STEM AUGERS
CFA-CONT.FLIGHT AUGERS
HA-HAND AUGER

NOTES: (*)BLOWS/6 in., In Three 6 in. Increments
REC %: Sample Recovery, %
(**)TPV-Total Photoionizable Vapors ppm (parts per million)

FIELD CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

NON COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	-11 to 30 blows/ft.
Dense	-31 to 50 blows/ft.
Very Dense	-51 blows/ft. or more

Relative Proportions

Descriptive Term	Percent
Trace	1 -10
Little	11-20
Some	21-35
And	36-50

Particle Size Identification

Boulders		-8 inch diameter or more
Cobbles		-3 to 8 inch diameter
Gravel	-Coarse	-1 to 3 inch
	Medium	-½ to 1 inch
	Fine	-¼ to ½ inch
Sand	-Coarse	2.00mm to ¼ inch (dia. of pencil lead)
	Medium	0.42 to 2.00mm (dia. of broom straw)
	Fine	0.074 to 0.42mm (Dia. of human hair)
Silt		0.074 to 0.002mm (Cannot see particles)

COHESIVE SOILS
(Clay, Silt and Combinations)

Consistency

Very Soft	- 3 blows/ft. or less
Soft	- 4 to 5 blows/ft.
Medium Stiff	- 6 to 10 blows/ft.
Stiff	-11 to 15 blows/ft.
Very Stiff	-16 top 30 blows/ft.
Hard	-31 blows/ft. or more

Plasticity

Degree of Plasticity	Plasticity Index
None to slight	0- 4
Slight	5- 7
Medium	8-22
High to Very High	over 22

Classification on logs are made by visual inspection of samples.

Standard Penetration Test — Driving a 2.0" O.D., 1-3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary for ATEC to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the test are recorded for each 6.0 inches of penetration on the drill log (Example — 6/8/9). The standard penetration test result can be obtained by adding the last two figures (i.e. 8+ 9 = 17 blows/ft.). (ASTM D-1586-67)

Strata Changes — In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (_______) represents an actually observed change, a dashed line (_ _ _ _) represents an estimated change.

Ground Water observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

APPENDIX
C

SITE EVALUATION

RCRA CLOSURE
GM-CPC
NORWOOD, OHIO

Appendix C

Analytical Results

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-263

SAMPLE ID B-1E

FRACTION 01D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3175
DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 137.0 ug/kg (as is)		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.0 %	S1V
toluene-d6	92.9 %	S2V
bromofluorobenzene	92.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT

LAB # 88-03-263

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-1G

FRACTION 02D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3183

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 138.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	95.4 %	S1V
toluene-d6	107.0 %	S2V
bromofluorobenzene	84.1 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-263

RECEIVED: 03/02/88 Results by Sample

SAMPLE ID B-1H

FRACTION 03D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3177

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 112.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	112.0 %	S1V
toluene-d6	105.0 %	S2V
bromofluorobenzene	99.4 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-263

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-1A

FRACTION 04D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3178

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 137.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	96.7 %	S1V
toluene-d6	119.0 %	S2V
bromofluorobenzene	101.0 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-263

SAMPLE ID B-2E

FRACTION 05D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3179
DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 98.5 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.7 %	S1V
toluene-d6	80.0 %	S2V
bromofluorobenzene	106.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-263

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-2G

FRACTION 06D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3180

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 110.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	93.2 %	S1V
toluene-d6	100.0 %	S2V
bromofluorobenzene	80.1 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-263

SAMPLE ID B-2H

FRACTION 07D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 02/29/88 17:00:00 Category

DATA FILE B3181
DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 126.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	102.0 %	S1V
toluene-d6	99.4 %	S2V
bromofluorobenzene	93.4 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-3E

FRACTION 01D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3185

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 153.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	99.8 %	S1V
toluene-d6	98.8 %	S2V
bromofluorobenzene	86.5 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-3G

FRACTION 02D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3186
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 120.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	85.6 %	S1V
toluene-d6	106.0 %	S2V
bromofluorobenzene	97.8 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-3H

FRACTION 03D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3187
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 158.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	107.0 %	S1V
toluene-d6	109.0 %	S2V
bromofluorobenzene	101.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-4E

FRACTION 04D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3188

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 95.8 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	102.0 %	S1V
toluene-d6	103.0 %	S2V
bromofluorobenzene	85.2 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-264

SAMPLE ID B-4G

FRACTION 05D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3189

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 131.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	96.6 %	S1V
toluene-d6	104.0 %	S2V
bromofluorobenzene	91.4 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-264

Results by Sample

RECEIVED: 03/02/88

SAMPLE ID B-4H

FRACTION 06D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3190

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 121.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	121.0 %	S1V
toluene-d6	107.0 %	S2V
bromofluorobenzene	85.8 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-263

SAMPLE ID B-1E SAMPLE # 01 FRACTIONS: A,B,C,D

Date & Time Collected 02/29/88 17:00:00 Category

AS 10.500 mg/Kg Dry Wt.	BA <49.4 mg/Kg Dry Wt.	CD 0.299 mg/Kg Dry Wt.	CN <0.716 mg/Kg Dry Wt.	CR 15.100 mg/Kg Dry Wt.	DRYWTI 82.200 %
HG 0.4760 mg/Kg Dry Wt.	PB 9.210 mg/Kg Dry Wt.	PHS 8.02 S.U.			

RECEIVED: 03/02/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-263

SAMPLE ID B-1G

SAMPLE # 02 FRACTIONS: A,B,C,D

Date & Time Collected 02/29/88 17:00:00 Category

AS 10.600 mg/Kg Dry Wt.	BA <44.2 mg/Kg Dry Wt.	CD 0.247 mg/Kg Dry Wt.	CN <0.641 mg/Kg Dry Wt.	CR 17.200 mg/Kg Dry Wt.	DRYWTI 85.500 %
HG 0.3300 mg/Kg Dry Wt.	PB 10.000 mg/Kg Dry Wt.	PHS 8.17 S.U.			

HOWARD LABS INC REPORT LAB # 88-03-263
RECEIVED: 03/02/88
Results by Sample

SAMPLE ID B-1H SAMPLE # 03 FRACTIONS: A, B, C, D
Date & Time Collected 02/29/88 17:00:00 Category

AS 10.800 mg/Kg Dry Wt.	BA 198.000 mg/Kg Dry Wt.	CD <0.215 mg/Kg Dry Wt.	CN <0.646 mg/Kg Dry Wt.	CR 15.700 mg/Kg Dry Wt.	DRYWTI 88.100 %
HG 0.1750 mg/Kg Dry Wt.	PB 10.600 mg/Kg Dry Wt.	PHS 8.22 S.U.			

HOWARD LABS INC REPORT LAB # 88-03-263
RECEIVED: 03/02/88
Results by Sample

SAMPLE ID B-2E SAMPLE # 05 FRACTIONS: A,B,C,D
Date & Time Collected 02/29/88 17:00:00 Category

AS	6.390 mg/Kg Dry Wt.	BA	82.700 mg/Kg Dry Wt.	CD	<0.260 mg/Kg Dry Wt.	CN	<0.687 mg/Kg Dry Wt.	CR	17.700 mg/Kg Dry Wt.	DRYWTI	78.700 %
HG	0.1690 mg/Kg Dry Wt.	PB	25.400 mg/Kg Dry Wt.	PHS	7.76 S.U.						

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-263

SAMPLE ID B-2G

SAMPLE # 06 FRACTIONS: A, B, C, D
Date & Time Collected 02/29/88 17:00:00 Category

AS	8.540 mg/Kg Dry Wt.	BA	117.000 mg/Kg Dry Wt.	CD	<0.206 mg/Kg Dry Wt.	CN	<0.744 mg/Kg Dry Wt.	CR	19.900 mg/Kg Dry Wt.	DRYWTI	81.000 %
HG	0.2320 mg/Kg Dry Wt.	PB	20.900 mg/Kg Dry Wt.	PHS	7.18 S.U.						

HOWARD LABS INC REPORT
LAB # 88-03-263
RECEIVED: 03/02/88
Results by Sample

SAMPLE ID B-2H
SAMPLE # 07 FRACTIONS: A, B, C, D
Date & Time Collected 02/29/88 17:00:00 Category

AS 8.830 mg/Kg Dry Wt.	BA <41.4 mg/Kg Dry Wt.	CD <0.207 mg/Kg Dry Wt.	CN <0.624 mg/Kg Dry Wt.	CR 12.000 mg/Kg Dry Wt.	DRYWTI 87.700 %
HG 0.3730 mg/Kg Dry Wt.	PB 8.180 mg/Kg Dry Wt.	PHS 7.95 S.U.			

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-3E SAMPLE # 01 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 18:00:00 Category

AS	10.700 mg/Kg Dry Wt.	BA	<70.9 mg/Kg Dry Wt.	CD	0.365 mg/Kg Dry Wt.	CN	<0.721 mg/Kg Dry Wt.	CR	16.800 mg/Kg Dry Wt.	DRYWTI	82.900 %
HG	0.1710 mg/Kg Dry Wt.	PB	7.840 mg/Kg Dry Wt.	PHS	7.92 S.U.						

HOWARD LABS INC REPORT LAB # 88-03-264
RECEIVED: 03/02/88
Results by Sample

SAMPLE ID B-3G SAMPLE # 02 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 18:00:00 Category

AS 5.560 mg/Kg Dry Wt.	BA <69.4 mg/Kg Dry Wt.	CD <0.347 mg/Kg Dry Wt.	CN <0.641 mg/Kg Dry Wt.	CR 22.300 mg/Kg Dry Wt.	DRYWTI 86.300 %
HG 0.1820 mg/Kg Dry Wt.	PB 7.530 mg/Kg Dry Wt.	PHS 8.22 S.U.			

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-3H SAMPLE # 03 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 18:00:00 Category

AS 5.520 mg/Kg Dry Wt.	BA <69.3 mg/Kg Dry Wt.	CD <0.346 mg/Kg Dry Wt.	CN <0.579 mg/Kg Dry Wt.	CR 21.000 mg/Kg Dry Wt.	DRYWTI 87.800 %
HG 0.2030 mg/Kg Dry Wt.	PB 9.310 mg/Kg Dry Wt.	PHS 8.25 S.U.			

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-4E
SAMPLE # 04 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 18:00:00 Category

AS 5.840 mg/Kg Dry Wt.	BA <68.4 mg/Kg Dry Wt.	CD <0.342 mg/Kg Dry Wt.	CN <0.598 mg/Kg Dry Wt.	CR 12.400 mg/Kg Dry Wt.	DRYWTI 80.600 %
HG 0.1060 mg/Kg Dry Wt.	PB 17.500 mg/Kg Dry Wt.	PHS 7.42 S.U.			

HOWARD LABS INC REPORT

LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-4G

SAMPLE # 05 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 18:00:00 Category

AS	6.760	mg/Kg Dry Wt.
BA	62.700	mg/Kg Dry Wt.
CD	<0.311	mg/Kg Dry Wt.
CN	<0.714	mg/Kg Dry Wt.
CR	22.300	mg/Kg Dry Wt.
DRYWTI	80.700	%
HG	<0.063	mg/Kg Dry Wt.
PB	12.900	mg/Kg Dry Wt.
PHS	7.91	S.U.

HOWARD LABS INC REPORT LAB # 88-03-264
RECEIVED: 03/02/88
Results by Sample

SAMPLE ID B-4H SAMPLE # 06 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 18:00:00 Category

AS 6.590 mg/Kg Dry Wt.	BA <63.9 mg/Kg Dry Wt.	CD <0.320 mg/Kg Dry Wt.	CN <0.570 mg/Kg Dry Wt.	CR 16.300 mg/Kg Dry Wt.	DRYWTI 91.900 %
HG <0.094 mg/Kg Dry Wt.	PB 12.200 mg/Kg Dry Wt.	PHS 8.21 S.U.			

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-5H

FRACTION 07D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3191
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 138.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	99.9 %	S1V
toluene-d6	109.0 %	S2V
bromofluorobenzene	105.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-264

RECEIVED: 03/02/88

Results by Sample

SAMPLE ID B-5I FRACTION 08D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3193

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 129.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.8 %	S1V
toluene-d6	98.9 %	S2V
bromofluorobenzene	101.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-264

Results by Sample

RECEIVED: 03/02/88

SAMPLE ID B-5J

FRACTION 09D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 18:00:00 Category

DATA FILE B3194

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 123.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	112.0 %	S1V
toluene-d6	103.0 %	S2V
bromofluorobenzene	96.5 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-616

SAMPLE ID B6-F

FRACTION 01D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 Category

DATA FILE B3195
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 149.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	121.0 %	S1V
toluene-d6	90.3 %	S2V
bromofluorobenzene	93.6 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-616

SAMPLE ID B6-G

FRACTION 02D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 Category

DATA FILE B3196
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 97.3 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	117.0 %	S1V
toluene-d6	89.7 %	S2V
bromofluorobenzene	88.1 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B6-H

FRACTION 03D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 Category

DATA FILE B3197

DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 104.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	89.7 %	S1V
toluene-d6	97.4 %	S2V
bromofluorobenzene	101.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B7-E

FRACTION 04D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 Category

DATA FILE B3198
DATE INJECTED 03/16/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 116.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	102.0 %	S1V
toluene-d6	105.0 %	S2V
bromofluorobenzene	95.1 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616

Results by Sample

RECEIVED: 03/10/88

SAMPLE ID B7-H FRACTION 05D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/01/88 Category

DATA FILE B3199
DATE INJECTED 03/16/88 ANALYST CMH VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 144.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	121.0 %	S1V
toluene-d6	78.5 %	S2V
bromofluorobenzene	87.4 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616
RECEIVED: 03/10/88
Results by Sample

SAMPLE ID B7-I
FRACTION 06D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/01/88 Category

DATA FILE B3200
DATE INJECTED 03/16/88
ANALYST CMH
VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 122.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	108.0 %	S1V
toluene-d6	110.0 %	S2V
bromofluorobenzene	108.0 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-5H SAMPLE # 07 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 18:00:00 Category

AS	BA	CR	DRYWTI	PHS
7.510	<75.8	19.200	86.500	8.12
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-5I

SAMPLE # 08 FRACTIONS: A, B, C, D
Date & Time Collected 03/01/88 18:00:00 Category

AS	BA	CR	DRYWTI	PHS
5.380	<61.3	16.500	87.100	8.43
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-264

SAMPLE ID B-5J

SAMPLE # 09 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 18:00:00 Category

AS	BA	CR	DRYWTI	PHS
4.920	131.000	25.300	87.500	8.40
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-616

SAMPLE ID B6-F

SAMPLE # 01 FRACTIONS: A, B, C, D

Date & Time Collected 03/01/88 Category

AS	BA	CR	DRYWTI	PHS
3.470	<41.6	10.300	89.700	9.46
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B6-G SAMPLE # 02 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 Category

AS 2.870	BA <40.9	CR 8.250	DRYWTI 91.900	PHS 9.04
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B6-H SAMPLE # 03 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 Category

AS	BA	CR	DRYWTI	PHS
3.330	<42.1	10.500	89.200	8.97
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-616

SAMPLE ID B7-E
SAMPLE # 04 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 Category

AS	BA	CR	DRYWTI	PHS
5.390 mg/Kg Dry Wt.	131.000 mg/Kg Dry Wt.	12.800 mg/Kg Dry Wt.	81.700 %	7.45 S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-616

SAMPLE ID B7-H

SAMPLE # 05 FRACTIONS: A,B,C,D

Date & Time Collected 03/01/88 Category

AS	BA	CR	DRYWTI	PHS
5.080 mg/Kg Dry Wt.	81.300 mg/Kg Dry Wt.	11.000 mg/Kg Dry Wt.	88.800 %	8.05 S.U.

HOWARD LABS INC REPORT LAB # 88-03-616
RECEIVED: 03/10/88
Results by Sample

SAMPLE ID B7-I SAMPLE # 06 FRACTIONS: A,B,C,D
Date & Time Collected 03/01/88 Category

AS	BA	CR	DRYWTI	PHS
4.660	<39.3	12.600	88.700	8.12
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 05/02/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-05-035

SAMPLE ID B-5H

SAMPLE # 01 FRACTIONS: A

Date & Time Collected 03/01/88 Category

CD 0.428 mg/Kg Dry Wt. PB 8.070 mg/Kg Dry Wt.

SAMPLE ID B-5I

SAMPLE # 02 FRACTIONS: A

Date & Time Collected 03/01/88 Category

CD <0.306 mg/Kg Dry Wt. PB 8.300 mg/Kg Dry Wt.

SAMPLE ID B-5J

SAMPLE # 03 FRACTIONS: A

Date & Time Collected 03/01/88 Category

CD 0.740 mg/Kg Dry Wt. PB 12.100 mg/Kg Dry Wt.

SAMPLE ID B-6F

SAMPLE # 04 FRACTIONS: A

Date & Time Collected 03/01/88 Category

CD <0.208 mg/Kg Dry Wt. PB 11.100 mg/Kg Dry Wt.

RECEIVED: 05/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-05-035

SAMPLE ID B-6G
SAMPLE # 05 FRACTIONS: A
Date & Time Collected 03/01/88 Category

CD <0.205 mg/Kg Dry Wt. PB 12.900 mg/Kg Dry Wt.

SAMPLE ID B-6H
SAMPLE # 06 FRACTIONS: A
Date & Time Collected 03/01/88 Category

CD <0.210 mg/Kg Dry Wt. PB 11.600 mg/Kg Dry Wt.

SAMPLE ID B-7E
SAMPLE # 07 FRACTIONS: A
Date & Time Collected 03/01/88 Category

CD <0.200 mg/Kg Dry Wt. PB 13.500 mg/Kg Dry Wt.

SAMPLE ID B-7H
SAMPLE # 08 FRACTIONS: A
Date & Time Collected 03/01/88 Category

CD <0.203 mg/Kg Dry Wt. PB 9.140 mg/Kg Dry Wt.

RECEIVED: 05/02/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-05-035

SAMPLE ID B-7I
SAMPLE # 09 FRACTIONS: A
Date & Time Collected 03/01/88 Category

CD 0.236 mg/Kg Dry Wt. PB 8.500 mg/Kg Dry Wt.

SAMPLE ID B-8F
SAMPLE # 10 FRACTIONS: A
Date & Time Collected 03/03/88 Category

CD <0.211 mg/Kg Dry Wt. PB 4.760 mg/Kg Dry Wt.

SAMPLE ID B-8H
SAMPLE # 11 FRACTIONS: A
Date & Time Collected 03/03/88 Category

CD <0.193 mg/Kg Dry Wt. PB 86.900 mg/Kg Dry Wt.

SAMPLE ID B-8I
SAMPLE # 12 FRACTIONS: A
Date & Time Collected 03/03/88 Category

CD <0.228 mg/Kg Dry Wt. PB 12.700 mg/Kg Dry Wt.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88 Results by Sample

SAMPLE ID B8-F FRACTION 07D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/03/88 Category

DATA FILE B3201

DATE INJECTED 03/16/88 ANALYST CMH VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 108.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	109.0 %	S1V
toluene-d6	121.0 %	S2V
bromofluorobenzene	87.4 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-616

SAMPLE ID B8-H

FRACTION 08D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/03/88 Category

DATA FILE B3370

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 146.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	89.3 %	S1V
toluene-d6	116.0 %	S2V
bromofluorobenzene	91.3 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B8-I

FRACTION 09D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/03/88 Category

DATA FILE B3371

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 144.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	106.0 %	S1V
toluene-d6	102.0 %	S2V
bromofluorobenzene	84.6 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-617

SAMPLE ID B9-E

FRACTION 03D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/08/88 Category

DATA FILE B3374
DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 149.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	90.9 %	S1V
toluene-d6	87.9 %	S2V
bromofluorobenzene	91.3 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-617

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B9-F FRACTION 04D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/08/88 Category

DATA FILE B3375

DATE INJECTED 03/15/88 ANALYST CMH VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 144.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	94.9 %	S1V
toluene-d6	106.0 %	S2V
bromofluorobenzene	103.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-617

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B9-G

FRACTION 05D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/08/88 Category

DATA FILE B3376

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 146.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	78.9 %	S1V
toluene-d6	115.0 %	S2V
bromofluorobenzene	90.5 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-617

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B10-E FRACTION 01D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/04/88 Category

DATA FILE B3372
DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 150.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	85.4 %	S1V
toluene-d6	110.0 %	S2V
bromofluorobenzene	108.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-617

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B10-F FRACTION 02D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/04/88 Category

DATA FILE B3373

DATE INJECTED 03/15/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 150.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	80.0 %	S1V
toluene-d6	116.0 %	S2V
bromofluorobenzene	91.1 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-618

SAMPLE ID B11-F

FRACTION 01D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/09/88 Category

DATA FILE B3377
DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 149.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	92.2 %	S1V
toluene-d6	93.9 %	S2V
bromofluorobenzene	87.9 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B11-G

FRACTION 02D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/09/88 Category

DATA FILE B3378

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 147.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	102.0 %	S1V
toluene-d6	105.0 %	S2V
bromofluorobenzene	93.1 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT

LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B11-H

FRACTION 03D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/09/88 Category

DATA FILE B3380

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 147.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	113.0 %	S1V
toluene-d6	121.0 %	S2V
bromofluorobenzene	83.7 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B12-F

FRACTION 04D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/10/88 Category

DATA FILE B3381

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 149.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	107.0 %	S1V
toluene-d6	106.0 %	S2V
bromofluorobenzene	79.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B12-G

FRACTION 05D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES

Date & Time Collected 03/10/88 Category

DATA FILE B3382

DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were		
detected with a detection		
limit of < 145.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	106.0 %	S1V
toluene-d6	96.7 %	S2V
bromofluorobenzene	84.8 %	S3V

CODE SV - Surrogate compound for QC check.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-618

SAMPLE ID B12-H

FRACTION 06D TEST CODE VOAMSC NAME GC/MS SCAN TOTAL VOLATILES
Date & Time Collected 03/10/88 Category

DATA FILE B3354
DATE INJECTED 03/22/88

ANALYST CMH

VERIFIED BY DLH

COMPOUND	RESULT	UNITS
No volatile compounds were detected with a detection limit of < 143.0 ug/Kg as is.		

The following are inter-laboratory QA/QC results for EPA Method 624/1624.

COMPOUND	RESULT	CODE
1,2-dichloroethane-d4	110.0 %	S1V
toluene-d6	94.4 %	S2V
bromofluorobenzene	101.0 %	S3V

CODE SV - Surrogate compound for QC check.

HOWARD LABS INC REPORT LAB # 88-03-616

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B8-F SAMPLE # 07 FRACTIONS: A,B,C,D

Date & Time Collected 03/03/88 Category ______

AS	BA	CR	DRYWTI	PHS
3.470	<42.1	8.470	90.600	8.19
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-616

SAMPLE ID 88-H SAMPLE # 08 FRACTIONS: A,B,C,D
Date & Time Collected 03/03/88 Category

AS	BA	CR	DRYWTI	PHS
14.100	70.100	14.100	87.100	7.74
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-616

SAMPLE ID 88-I

SAMPLE # 09 FRACTIONS: A,B,C,D

Date & Time Collected 03/03/88 Category

AS	BA	CR	DRYWTI	PHS
3.190	<45.5	13.000	81.200	8.40
mg/Kg Dry Wt.	mg/Kg Dry Wt.	mg/Kg Dry Wt.	%	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-617

SAMPLE ID B9-E

SAMPLE # 03 FRACTIONS: A,B,C,D

Date & Time Collected 03/08/88 Category

Parameter	Result	Units
AS	4.960	mg/Kg Dry Wt.
BA	57.700	mg/Kg Dry Wt.
CD	0.261	mg/Kg Dry Wt.
CR	13.500	mg/Kg Dry Wt.
DRYWTI	88.000	%
HG	0.0550	mg/Kg Dry Wt.
PB	12.500	mg/Kg Dry Wt.
PHS	8.73	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-617

SAMPLE ID B9-F
SAMPLE # 04 FRACTIONS: A,B,C,D
Date & Time Collected 03/08/88 Category

AS 3.230 mg/Kg Dry Wt.	BA <43.0 mg/Kg Dry Wt.	CD 0.230 mg/Kg Dry Wt.	CR 11.000 mg/Kg Dry Wt.	DRYWTI 92.800 %	HG <0.061 mg/Kg Dry Wt.
PB 39.500 mg/Kg Dry Wt.	PHS 9.15 S.U.				

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-617

SAMPLE ID B9-G
SAMPLE # 05 FRACTIONS: A,B,C,D
Date & Time Collected 03/08/88 Category

AS 3.000 mg/Kg Dry Wt.	BA 73.600 mg/Kg Dry Wt.	CD <0.210 mg/Kg Dry Wt.	CR 13.000 mg/Kg Dry Wt.	DRYWTI 82.400 %	HG <0.064 mg/Kg Dry Wt.
PB 21.700 mg/Kg Dry Wt.	PHS 11.86 S.U.				

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-617

SAMPLE ID B10-E
SAMPLE # 01 FRACTIONS: A,B,C,D
Date & Time Collected 03/04/88 Category

AS	2.150	mg/Kg Dry Wt.
BA	<38.3	mg/Kg Dry Wt.
CD	<0.192	mg/Kg Dry Wt.
CR	9.960	mg/Kg Dry Wt.
DRYWTI	95.600	%
HG	<0.067	mg/Kg Dry Wt.
PB	4.850	mg/Kg Dry Wt.
PHS	11.28	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

LAB # 88-03-617

Results by Sample

SAMPLE ID B10-F

SAMPLE # 02 FRACTIONS: A,B,C,D

Date & Time Collected 03/04/88 Category

AS	3.670	mg/Kg Dry Wt.
BA	47.800	mg/Kg Dry Wt.
CD	0.252	mg/Kg Dry Wt.
CR	15.700	mg/Kg Dry Wt.
DRYWTI	85.600	%
HG	<0.073	mg/Kg Dry Wt.
PB	12.500	mg/Kg Dry Wt.
PHS	8.95	S.U.

RECEIVED: 03/10/88

HOWARD LABS INC REPORT

Results by Sample

LAB # 88-03-618

SAMPLE ID B11-F

SAMPLE # 01 FRACTIONS: A, B, C, D

Date & Time Collected 03/09/88 Category

Parameter	Value	Units
AS	3.450	mg/Kg Dry Wt.
BA	<38.6	mg/Kg Dry Wt.
CD	<0.193	mg/Kg Dry Wt.
CR	19.500	mg/Kg Dry Wt.
DRYWTI	87.100	%
HG	<0.089	mg/Kg Dry Wt.
PB	7.560	mg/Kg Dry Wt.
PHS	10.54	S.U.

HOWARD LABS INC REPORT LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B11-G

SAMPLE # 02 FRACTIONS: A,B,C,D

Date & Time Collected 03/09/88 Category

AS	3.900 mg/Kg Dry Wt.	BA	<42.7 mg/Kg Dry Wt.
CD	<0.213 mg/Kg Dry Wt.	CR	18.200 mg/Kg Dry Wt.
DRYWTI	87.500 %	HG	<0.099 mg/Kg Dry Wt.
PB	6.100 mg/Kg Dry Wt.	PHS	9.16 S.U.

HOWARD LABS INC REFPORT LAB # 88-03-618

RECEIVED: 03/10/88 Results by Sample

SAMPLE ID B11-H SAMPLE # 03 FRACTIONS: A,B,C,D

Date & Time Collected 03/09/88 Category

AS 3.970 mg/Kg Dry Wt.	BA <45.4 mg/Kg Dry Wt.	CD <0.227 mg/Kg Dry Wt.	CR 17.300 mg/Kg Dry Wt.	DRYWTI 87.400 %	HG <0.083 mg/Kg Dry Wt.
PB 7.920 mg/Kg Dry Wt.	PHS 8.97 S.U.				

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-618

SAMPLE ID B12-F

SAMPLE # 04 FRACTIONS: A,B,C,D
Date & Time Collected 03/10/88 Category

Parameter	Result	Units
AS	1.330	mg/Kg Dry Wt.
BA	<47.6	mg/Kg Dry Wt.
CD	<0.238	mg/Kg Dry Wt.
CR	11.900	mg/Kg Dry Wt.
DRYWTI	85.000	%
HG	<0.092	mg/Kg Dry Wt.
PB	9.020	mg/Kg Dry Wt.
PHS	6.34	S.U.

HOWARD LABS INC REPORT LAB # 88-03-618

RECEIVED: 03/10/88

Results by Sample

SAMPLE ID B12-G SAMPLE # 05 FRACTIONS: A,B,C,D

Date & Time Collected 03/10/88 Category

AS	11.500 mg/Kg Dry Wt.	BA	418.000 mg/Kg Dry Wt.	CD	0.377 mg/Kg Dry Wt.	CR	22.700 mg/Kg Dry Wt.	DRYWTI	86.200 %	HG	<0.073 mg/Kg Dry Wt.
PB	7.190 mg/Kg Dry Wt.	PHS	7.31 S.U.								

RECEIVED: 03/10/88

HOWARD LABS INC REPORT
Results by Sample

LAB # 88-03-618

SAMPLE ID B12-H SAMPLE # 06 FRACTIONS: A, B, C, D
Date & Time Collected 03/10/88 Category

AS	5.560 mg/Kg Dry Wt.	BA	39.600 mg/Kg Dry Wt.	CD	0.768 mg/Kg Dry Wt.	CR	33.000 mg/Kg Dry Wt.	DRYWTI	82.600 %	HG	<0.053 mg/Kg Dry Wt.
PB	11.700 mg/Kg Dry Wt.	PHS	7.92 S.U.								

RECEIVED: 08/03/87

HOWARD LABS INC REPORT LAB # 87-08-043

Results by Sample

SAMPLE ID MW-2-A SAMPLE # 01 FRACTIONS: A,B,C,D,E

Date & Time Collected 08/02/87 23:00:00 Category

ADW 90.60 %	AG <0.333 mg/Kg Air Dry	AS 4.600 mg/Kg Air Dry	BA <66.5 mg/Kg Air Dry	CD <0.333 mg/Kg Air Dry	CR 10.800 mg/Kg Air Dry
HG <0.099 mg/Kg Air Dry	PB 4.790 mg/Kg Air Dry	SE <0.745 mg/Kg Air Dry			

ECEIVED: 08/03/87

HOWARD LABS INC REPORT

Results by Sample

LAB # 87-08-043

SAMPLE ID MW-2-B

SAMPLE # 02 FRACTIONS: A,B,C,D,E

Date & Time Collected 08/02/87 23:00:00 Category ____

ADW 81.10 %	AG <0.333 mg/Kg Air Dry	AS 7.380 mg/Kg Air Dry	BA <66.7 mg/Kg Air Dry	CD <0.333 mg/Kg Air Dry	CR 19.900 mg/Kg Air Dry
HG <0.098 mg/Kg Air Dry	PB 8.330 mg/Kg Air Dry	SE <0.816 mg/Kg Air Dry			

CEIVED: 08/03/87

HOWARD LABS INC REPORT LAB # 87-08-043

Results by Sample

SAMPLE ID MW-2-C SAMPLE # 03 FRACTIONS: A,B,C,D,E

Date & Time Collected 08/02/87 23:00:00 Category

ADW 87.50 %	AG <0.329 mg/Kg Air Dry	AS 7.630 mg/Kg Air Dry	BA 161.000 mg/Kg Air Dry	CD <0.329 mg/Kg Air Dry	CR 19.400 mg/Kg Air Dry
HG <0.097 mg/Kg Air Dry	PB 10.500 mg/Kg Air Dry	SE <0.816 mg/Kg Air Dry			

CEIVED: 08/07/87

HOWARD LABS INC REPORT

Results by Sample

LAB # 87-08-377

SAMPLE ID MW-3-A

SAMPLE # 01 FRACTIONS: A,B,C,D,E

Date & Time Collected 08/07/87 21:00:00 Category

ADW 89.20 %	AG <0.247 mg/Kg Air Dry	AS 4.840 mg/Kg Air Dry	BA 55.900 mg/Kg Air Dry	CD <0.247 mg/Kg Air Dry	CR 13.100 mg/Kg Air Dry
HG <0.100 mg/Kg Air Dry	PB 17.300 mg/Kg Air Dry	SE <0.698 mg/Kg Air Dry			

HOWARD LABS INC REPORT LAB # 87-08-377
RECEIVED: 08/07/87
Results by Sample

SAMPLE ID MW-3-B SAMPLE # 02 FRACTIONS: A,B,C,D,E
Date & Time Collected 08/07/87 21:00:00 Category

ADW 88.10 %	AG <0.248 mg/Kg Air Dry	AS 7.830 mg/Kg Air Dry	BA 262.000 mg/Kg Air Dry	CD 0.272 mg/Kg Air Dry	CR 14.400 mg/Kg Air Dry
HG <0.099 mg/Kg Air Dry	PB 14.100 mg/Kg Air Dry	SE <0.727 mg/Kg Air Dry			

CEIVED: 08/07/87

HOWARD LABS INC REPORT

Results by Sample

LAB # 87-08-377

SAMPLE ID MW-3-C

SAMPLE # 03 FRACTIONS: A, B, C, D, E

Date & Time Collected 08/07/87 21:00:00 Category

ADW 87.90 %	AG <0.321 mg/Kg Air Dry	AS 5.540 mg/Kg Air Dry	BA <64.2 mg/Kg Air Dry	CD <0.321 mg/Kg Air Dry	CR 16.100 mg/Kg Air Dry
HG <0.107 mg/Kg Air Dry	PB 4.010 mg/Kg Air Dry	SE <0.651 mg/Kg Air Dry			

HOWARD LABS INC REPORT

LAB # 87-07-B67

RECEIVED: 07/24/87

Results by Sample

SAMPLE ID MW-9-A

SAMPLE # 01 FRACTIONS: A,B,C,D,E

Date & Time Collected 07/24/87 18:40:00 Category

ADW 89.00 %	AG <0.254 mg/Kg Air Dry	AS 3.340 mg/Kg Air Dry	BA 235.000 mg/Kg Air Dry	CD <0.254 mg/Kg Air Dry	CR 14.700 mg/Kg Air Dry
HG <0.099 mg/Kg Air Dry	PB 13.400 mg/Kg Air Dry	SE <0.698 mg/Kg Air Dry			

 HOWARD LABS INC REPORT LAB # 87-07-B67
RECEIVED: 07/24/87 Results by Sample

SAMPLE ID MW-9-B SAMPLE # 02 FRACTIONS: A,B,C,D,E
Date & Time Collected 07/24/87 18:40:00 Category

ADW 83.90 %	AG <0.268 mg/Kg Air Dry	AS 6.960 mg/Kg Air Dry	BA 207.000 mg/Kg Air Dry	CD 0.408 mg/Kg Air Dry	CR 28.200 mg/Kg Air Dry
HG 0.1640 mg/Kg Air Dry	PB 20.000 mg/Kg Air Dry	SE <0.767 mg/Kg Air Dry			

RECEIVED: 07/24/87

HOWARD LABS INC REPORT
Results by Sample

LAB # 87-07-B67

SAMPLE ID MW-9-C
SAMPLE # 03 FRACTIONS: A,B,C,D,E
Date & Time Collected 07/24/87 18:40:00 Category

ADW 91.80 %	AG <0.268 mg/Kg Air Dry	AS 4.750 mg/Kg Air Dry	BA 884.000 mg/Kg Air Dry	CD <0.268 mg/Kg Air Dry	CR 13.700 mg/Kg Air Dry
HG 1.7000 mg/Kg Air Dry	PB 9.560 mg/Kg Air Dry	SE <0.618 mg/Kg Air Dry			

HOWARD LABS INC REPORT LAB # 87-07-B66

RECEIVED: 07/24/87 Results by Sample

SAMPLE ID MW-10-A SAMPLE # 01 FRACTIONS: A,B,C,D,E

Date & Time Collected 07/23/87 20:18:00 Category

ADW 85.30 %	AG <0.282 mg/Kg Air Dry	AS 7.060 mg/Kg Air Dry	BA 132.000 mg/Kg Air Dry	CD <0.327 mg/Kg Air Dry	CR 22.300 mg/Kg Air Dry
HG <0.095 mg/Kg Air Dry	PB 11.800 mg/Kg Air Dry	SE <0.821 mg/Kg Air Dry			

RECEIVED: 07/24/87

Results by Sample

SAMPLE ID MW-10-B SAMPLE # 02 FRACTIONS: A,B,C,D,E
Date & Time Collected 07/23/87 20:15:00 Category

ADW	86.40	%
AG	<0.331	mg/Kg Air Dry
AS	9.910	mg/Kg Air Dry
BA	136.000	mg/Kg Air Dry
CD	0.454	mg/Kg Air Dry
CR	19.200	mg/Kg Air Dry
HG	<0.126	mg/Kg Air Dry
PB	13.900	mg/Kg Air Dry
SE	<1.58	mg/Kg Air Dry

RECEIVED: 07/24/87

HOWARD LABS INC REPORT

Results by Sample

LAB # 87-07-B66

SAMPLE ID MW-10-C

SAMPLE # 03 FRACTIONS: A,B,C,D,E

Date & Time Collected 07/23/87 20:15:00 Category

ADW 89.60 %	AG <0.333 mg/Kg Air Dry	AS 4.360 mg/Kg Air Dry	BA <66.6 mg/Kg Air Dry	CD <0.333 mg/Kg Air Dry	CR 20.200 mg/Kg Air Dry
HG 0.6100 mg/Kg Air Dry	PB 6.600 mg/Kg Air Dry	SE <0.833 mg/Kg Air Dry			

APPENDIX D

SITE EVALUATION

RCRA CLOSURE
GM-CPC
NORWOOD, OHIO

Appendix D

Permeability and CEC Laboratory Results

REPORT OF TEST RESULTS

ATEC Project Number 21-87035

DATE: April 8, 1988

CLIENT: General Motors Corporation
P. O. Box 12171
Norwood, OH 45212

SAMPLE IDENTIFICATION: CPC, Norwood

SAMPLE TAKEN BY: ATEC
DATE RECEIVED: March 15, 1988

SAMPLE ID	CEC Meq/100g
B1 16-18	12.5
B2 16-18	11.3
B3 16-18	10.0
B4 16-18	10.2
B5 20-22	9.8
B7 18-20	20.0
B8 16-18	10.0
B11 16-18	13.3

Respectfully submitted,
ATEC Associates, Inc.

Environmental/Analytical Testing Division c - ' 1c

DP

ĀTE Associates, Inc.

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT Gm CPC Lab. No. 21-87035

PROJECT General Motors Norwood

Boring No. B-1 Sample No. 8*1 Depth 16-18

Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 52.5	TOP (Cm.) 32.4	CELL (In.)	FLOW, Q (cm³) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				53	50	55				
3-24	15:17			6.35	6.9	3.65					53.7
3-25	8:38	62460		5.45	25.6	→		5.92		5.3 X 10^{-8}
—	10:18			off						
—	12:00			on						
3-25	18:23			5.1	33.7					
3-26	9:19	86340		4.45	46.5	→		6.62		4.7 X 10^{-8}
					drained					
3-26	9:20			4.45	4.20					
3-27	6:39	76740		3.50	23.5	→		6.11		4.5 X 10^{-8}
3-28	9:08	95340		2.60	42.0	→		5.86		3.8 X 10^{-8}
									Ave	4.6 X 10^{-8}

42 min. (beside the 10:18 and 12:00 rows)

AM (beside the 3-27 row)

D — ~~2.88~~ — 7.31

H — ~~2.12~~ — 5.38

*h = (Bottom Burette Pressure - Top Burette Pressure)
± Elevation Difference of Top and Bottom Burette Water Levels

Tx Sat. C.U. Conf. Press ___ psi over Bp   Page - 1

Backpressure Saturation Data.   Cell - 10

Tested by GLP   Date 3-18

Job No 21-87035   Boring No. B-1   Sample No ______

Test No ______   Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-18	0	0	.690		6.60	37.5	0.0			
	10	0	5.90		6.60	37.5	6.2	—	—	—
	10	8	5.85		6.55	36.5	8.9			
3-21 :32	10	8	5.75		6.25	30.2	8.9			
	15	8	5.50		6.20	29.7	12.1	—	3.2	64
	15	13	5.50		6.20	29.7	13.9			
3-21 ?:03	15	13	5.50		6.20	30.0	13.8			
	20	13	5.25		6.20	30.0	17.5	—	3.7	74
	20	18	5.25		6.15	29.9	18.8			
3-? 5:16	20	18	5.25		6.15	30.1	18.8			
	25	18	5.05		6.15	30.1	22.6	—	3.8	76
	25	23	5.05		6.15	30.0	23.7			
3-2 8:52	25	23	5.05		6.10	30.1	23.7			
	30	23	4.90		6.10	30.1	27.9	—	4.2	84
	30	28	4.90		6.10	30.1	28.7			
3-2 :46	30	28	4.80		6.10	30.0	28.5			
	35	28	4.80		6.10	30.0	32.9	—	4.4	88
	35	33	4.60		6.10	29.9	33.4			
3-23 2:56	35	33	4.60		6.10	28.9	33.4			
	40	33	4.40		6.10	28.9	38.0	—	4.6	92
	40	38	4.40		6.10	28.8	38.6			

TX Sat. C.U. Conf. Press ___ psi over Bp   Page - 2

Backpressure Saturation Data.   Cell - 10

Tested by GEP   Date ______

Job No 21-87035   Boring No. B-1   Sample No ______

Test No ______   Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-5 [illegible] 20	40	38	4.40		6.20	28.0	38.8			
	45	38	4.20		6.20	28.0	43.0	—	4.4	88 ?
	45	43	4.20		6.20	28.0	43.6			
3-24 :30	45	43	4.15		6.25	25.5	43.8			
	50	43	4.00		6.25	25.5	48.4	—	4.6	92
	50	48	4.00		6.25	25.5	48.8			
3-24 3 :29	50	48	3.85		6.35	23.6	48.6			
	55	48	3.70		6.35	23.6	53.2	—	4.6	92
	55	53	3.70		6.35	23.6	53.7			

ATL Associates, Inc.

Tak out 3-28

Ce - 4

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM - CPC Lab. No. 21-87035
PROJECT General Motors Norwood
Boring No. 2 Sample No. 8* Depth 16'-18'
Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 53.3	TOP (Cm.) 31.4	CELL (In.)	FLOW, Q (cm³) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)	
				48	45	50					
3-24	8:23			6.95	6.0	3.15					49.2
3-25	8:36	87180		6.65	14.2	→		2.60		1.6×10^{-8}	49.0
3-25	10:18			off							
~~3-25~~	~~[illegible]~~			ON							
~~3-25~~	~~[illegible]~~			~~6.6~~	~~14.7~~						
3-26	9:18			ON							
3-26	9:18			6.60	14.9						
AM 3-27	6:37	76740		6.35	20.7	→		1.84		1.3×10^{-8}	
3-28	9:06	95340		6.05	27.1	→		2.03		1.2×10^{-8}	
									Ave	1.4×10^{-8}	

D — ~~2.87~~ — 7.29

H — 5.06 — 5.23

*h = (Bottom Burette Pressure - Top Burette Pressure) ± Elevation Difference of Top and Bottom Burette Water Levels

TX Sat. C.U. Conf. Press ___ psi over Bp Page-1

Backpressure Saturation Data. Cell-4

Tested by GP Date 3-18

Job No 21-87035 Boring No B-2 Sample No ___

Test No ___ Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B=\frac{\Delta u}{\Delta\sigma_3}$	
3- [illegible]	0	0	6.65		7.55	36.5	0.3				
	10	0	5.30		7.55	36.5	9.2	—	—	—	
	10	8	5.25		7.55	36.5	9.6				
3- 25	10	8	5.20		7.20	32.7	9.6				
	15	8	4.90		7.20	32.7	14.6	—	5.0	~~100~~	?
	15	13	4.90		7.20	32.7	14.7				
3-21 [illegible]54	15	13	4.85		7.15	32.6	14.6				
	20	13	4.60		7.15	32.6	18.8	—	4.2	84	
	20	18	4.60		7.15	32.2	19.4				
3-21 0757	20	18	4.70		7.10	32.0	19.4				
	25	18	4.45		7.10	32.0	24.3	—	4.9	~~98~~	?
	25	23	4.45		7.10	32.0	24.3				
3- 8:45	25	23	4.30		7.10	32.5	24.4				
	30	23	4.10		7.10	32.5	28.9	—	4.5	90	
	30	28	4.10		7.10	32.4	29.4				
3- 2:34	30	28	4.00		7.10	32.4	29.3				
	35	28	3.85		7.10	32.4	33.5	—	4.2	84	?
	35	33	3.85		7.05	32.2	34.2				
3- 3:10	35	33	3.85		7.00	32.4	34.2				
	40	33	3.70		7.00	32.4	38.8	—	4.6	92	
	40	38	3.65		7.00	32.3	39.2				

Tx Sat. C.U. Conf. Press ___ psi over Bp Page –

Backpressure Saturation Data. Cell – 4

Tested by GLP Date ______

Job No 21-87035 Boring No B-2 Sample No ______

Test No ______ Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-23 :00	40	38	3.70		7.00	32.4	39.1			
	45	38	3.55		7.00	32.4	43.7	—	4.6	92
	45	43	3.55		7.00	32.3	44.1			
3-24 4:16	45	43	3.40		6.95	32.0	44.3			
	50	43	3.25		6.95	32.0	49.1	—	4.8	96
	50	48	3.20		6.95	32.0	49.2			

ĀT. , Associates, Inc. 11-91

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM CPC Lab. No. 21-87035
PROJECT General Motors Norwood
Boring No. 3 Sample No. 8 Depth 16-18'
Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 52.8	TOP (Cm.) 29.9	CELL (In.)	FLOW, Q (cm³) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				43	40	45				
4/4/88	12:15p			6.95	8.4	4.25				
	16:30			6.95	10.3	4.20				
4/5/88	9:02a.	74820		6.70	14.7	4.20		2.00		1.4×10^{-8}
	15:40			6.65	16.2	4.20				
4/6/88	9:26	87840		6.45	20.2	4.10		1.74		1.1×10^{-8}
	15:15			6.40	21.6	4.10				
4/7/88	9:32	86760		6.20	25.3	4.10		1.62		1.1×10^{-8}
									Ave.	1.2×10^{-8}

D — 2.86 7.26
H — 2.12 5.38

*h = (Bottom Burette Pressure – Top Burette Pressure)
± Elevation Difference of Top and Bottom Burette Water Levels

Tx Sat. C.U. Conf. Press ___ psi over BP — Page-2

Backpressure Saturation Data. — Cell-9

Tested by Sef — Date 4/1/88

Job No 21-87035 Boring No 3 Sample No 8*

Test No ___ Depth 16-18'

Date & Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs	BP Burette cc's	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
4/1 4:45 p	35	33	4.80		7.00	30.8	33.7			
	40	33	4.65		7.00	30.7	38.5		48	96
	40	38	4.60		7.00	30.7	38.7			
			(Closed valves) Turned Pressures off for weekend.							
4/4 9:50 A	40	38	4.50		7.00	30.4	38.8			
	45	38	4.30		7.00	30.4	43.7		49	98
	45	43	4.30		6.95	30.3	44.0			

TX Sat. C.U. Conf. Press ___ psi over Bp — Page - 1

Backpressure Saturation Data. — Cell - 9

Tested by Sy — Date 3/30/88

Job No 21-87035 — Boring No 3 — Sample No 8

Test No ______ Depth 16-18'

Date Time	Cell σ_3 psi	T+B σ_{BP} psi	Ext Burette Divs Cell	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3/ 3:25 P	0	0	7.10		7.35	36.8	1.0			
	10	0	6.30		7.35	36.8	9.8			
	10	8	6.25		7.35	36.3	8.9			
3/31 10:25 A	10	8	5.95		7.20	33.0	9.0			
	15	8	5.75		7.15	32.9	12.9		3.9	78
	15	13	5.75		7.15	32.4	14.0			
3/ 1:30 P	15	13	5.65		7.15	32.5	14.0			
	20	[illegible]	5.50		7.15	32.5	17.7		3.7	.74
	[illegible]	[illegible]	5.50		7.10	32.0	19.0			
3/31 4:15 P	20	18	5.45		7.10	31.8	19.0			
	25	18	5.30		7.10	31.8	22.7		3.7	74
	25	23	5.30		7.10	31.5	23.8			
4/1 10:10 A	25	23	5.20		7.00	31.2	24.2			
	30	23	5.00		7.00	31.1	28.7		4.5	90
	30	28	5.00		7.00	31.0	29.1			
4/1 1:20 P	30	28	4.95		7.00	30.9	28.8			
	35	28	4.80		7.00	30.9	33.4		4.6	92
	35	33	4.80		7.00	30.8	33.8			

ATI Associates, Inc.

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM C/C   Lab. No. 21-87035

PROJECT General Motors Norwood

Boring No. 13 5   Sample No. 8*   Depth 20-22

Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 52.8	BURRETTE READING TOP (Cm.) 29.9	BURRETTE READING CELL (In.)	FLOW, Q (cm^3) IN	FLOW, Q (cm^3) OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				48	45	50				
3-24	8:30			6.20	6.0	3.35				
3-25	8:37	86820		5.90	13.4			2.34		1.5×10^{-8}
25	10:18			OFF						
25	12:01			ON						
3-25	18:23			5.80	15.8					
3-26	9:19	86340		5.60	19.6			1.96		1.3×10^{-8}
3-27	6:38	76740		5.35	24.4			1.52		1.2×10^{-8}
3-28	9:07	95340		5.10	30.2			1.84		1.2×10^{-8}
									Ave	1.3×10^{-8}

43 min.

AM

48.9

D — ~~287~~ 7.29

H — ~~216~~ 5.49

*h = (Bottom Burette Pressure - Top Burette Pressure) ± Elevation Difference of Top and Bottom Burette Water Levels

Tx Sat. C.U. Conf. Press ___ psi over Bp   Page - 2

Backpressure Saturation Data.   Cell - 9

Tested by GP   Date ______

Job No 21-87035   Boring No. B-5   Sample No ______

Test No ______   Depth 20-22

Date & Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-2[illegible] [illegible] 04	40	38	3.85		6.25	33.8	38.5			
	45	38	3.70		6.25	33.8	43.1	—	4.7	94
	45	43	3.70		6.25	33.7	43.6			
3-24 8 [illegible]4	45	43	3.55		6.20	33.7	43.8			
	50	43	3.40		6.20	33.7	48.6	—	4.8	96
	50	48	3.40		6.20	33.7	49.0			

Tx Sat. C.U. Conf. Press ___ psi over Bp   Page - 1

Backpressure Saturation Data.   Cell - 9

Tested by CP   Date 3-18

Job No 21-87035 Boring No B-5 Sample No ——

Test No ____ Depth 20-22

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-18	0	0	6.50		6.60	35.3	0.2			
	10	0	5.55		6.60	35.3	7.9	—	—	—
	10	8	5.50		6.60	35.9	8.9			
3-21 :27	10	8	4.90		6.40	34.7	8.9			
	15	8	4.75		6.40	34.7	11.9	—	3.0	60
	15	13	4.75		6.40	34.3	14.0			
3-21 1:59	15	13	4.70		6.40	34.2	13.8			
	20	13	4.55		6.40	34.2	17.1	—	3.3	66
	20	18	4.55		6.35	33.9	18.9			
3-21 5:11	20	18	4.60		6.35	33.8	18.7			
	25	18	4.40		6.35	33.8	22.7	—	4 0	80
	25	23	4.40		6.35	33.7	23.6			
3-2 8:47	25	23	4.35		6.30	33.6	23.9			
	30	23	4.20		6.30	33.6	27.9	—	40	80
	30	28	4.20		6.30	33.5	28.7			
3-2 :42	30	28	4.20		6.30	33.4	28.6			
	35	28	4.00		6.30	33.4	32.9	—	4.3	86
	35	33	4.00		6.30	33.3	33.6			
3-23 :45	35	33	4.00		6.25	33.8	33.6			
	40	33	3.85		6.25	33.8	38.1	—	4.5	90
	40	38	3.85		6.25	33.7	38.6			

Co. 1 2

ĀTE Associates, Inc.

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM - CPC Lab. No. 21-87035

PROJECT General Motors Norwood

Boring No. 7 Sample No. Depth 18'-20'

Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 52.4	TOP (Cm.) 23.0	CELL (In.)	FLOW, Q (cm^3) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				38	35	40				
3-28	9:06			6.80	10.1	4.1				
3-28	17:28			6.75	14.1					
3-29	8:58	85920		6.50	18.7			2.72		1.5×10^{-8}
3-29	17:23			6.40	21.2					
3-30	8:38	85200		6.20	25.4			2.12		1.3×10^{-8}
3-30	16:51			6.10	27.7					
3-31	10:58	94800		5.50	43.4			5.70		3.2×10^{-8}
									Ave. =	2.0×10^{-8}

D — ~~2.86~~ | 7.26

H — 1.92 | 4.88

*h = (Bottom Burette Pressure - Top Burette Pressure) ± Elevation Difference of Top and Bottom Burette Water Levels

Tx Sat. C.U. Conf. Press ___ psi over Bp Page - 1

Backpressure Saturation Data. Cell - 1

Tested by GP Date 3-24

Job No ________ Boring No 7 Sample No ________

Test No ______ Depth 18-20

Date & Time	σ_3 Psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-24 1:35	0	0	7.10		7.00	40.3	0.2			
	10	0	6.05		7.00	40.3	10.0	—	—	—
	10	8	5.95		7.00	41.8	8.9			
3-25 8:39	10	8	5.50		6.90	40.8	9.0			
	15	8	5.30		6.90	40.8	12.8	—	3.8	76
	15	13	5.30		6.90	40.5	14.1			
3-25 ?:51	15	13	5.20		7.00	40.0	13.9			
	20	13	5.00		7.00	39.9	17.5	—	3.6	72 ?
	20	18	5.00		6.90	39.6	18.9			
2? 5:02	20	18	5.00		7.00	39.6	18.9			
	25	18	4.85		6.90	39.6	23.0	—	4.1	82
	25	23	4.85		6.85	39.4	24.1			
3- 9:14	25	23	4.75		6.90	38.1	24.2			
	30	23	4.60		6.90	38.1	28.4	—	4.2	84
	30	28	4.60		6.90	37.9	29.2			
3- 7 AM 34	30	28	4.55		6.85	37.8	29.2			
	35	28	4.40		6.85	37.8	33.6	—	4.4	88
	35	33	4.40		6.85	37.7	34.3			
3- 8:59	35	33	4.25		6.85	37.6	34.1			
	40	33	4.15		6.85	37.6	38.9	—	4.8	96
	40	38	4.15		6.80	37.6	39.3			

ATI Associates, Inc.

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM CPC Lab. No. 21-87035
PROJECT General Motors Norwood
Boring No. B-8 Sample No. 8T Depth 20-22
Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 52.5	TOP (Cm.) 32.4	CELL (In.)	FLOW, Q (cm³) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				43	40	45				
4/4	12:25p			7.00	7.7	3.40				
	16:35p			7.00	10.2	3.25				
4/5/88	9:04a	74340		6.80	14.3	3.30		2.09		1.5×10^{-8}
	15:42			6.65	16.9	3.30				
4/6/88	9:25a	87660		6.30	23.3	3.25		2.85		1.8×10^{-8}
	15:20			6.25	25.5	3.20				
4/7/88	9:33	86880		5.90	31.7	3.30		2.66		1.8×10^{-8}
									Ave.	1.7×10^{-8}

2.24

D — 2.85 7.24
H — 2.05 5.21

*h = (Bottom Burette Pressure – Top Burette Pressure)
± Elevation Difference of Top and Bottom Burette Water Levels

TX Sat. C.U. Conf. Press ___ psi over Bp   Page - 1

Backpressure Saturation Data.   Cell - 10

Tested by ___   Date 3/30

Job No 21-87035 Boring No 8 Sample No 8*

Test No ___ Depth 20-22

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs Cell	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3/ 4:45 P	0	0	7.15		7.10	38.2	2.0			
	10	0	6.10		7.10	38.2	10.0			
	10	8	6.00		7.10	40.1	8.9			
3/31 10:15 A	10	8	5.50		7.10	41.0	9.1			
	15	8	5.25		7.10	40.9	12.3		3.2	64
	15	13	5.25		7.05	40.7	14.0			
3/ 1:37 P	15	13	5.15		7.10	41.1	13.9			
	20	13	4.90		7.10	41.0	17.1		3.2	.64
	20	12	4.90		7.05	40.8	19.0			
3/31 4:25 P	20	18	4.85		7.05	41.0	19.0			
	25	18	4.60		7.05	41.0	22.6		3.6	72
	25	23	4.60		7.05	40.8	23.8			
4/ 10:15 P	25	23	4.50		7.00	40.4	23.9			
	30	23	4.30		7.00	40.3	27.9		4.0	80
	30	28	4.30		7.00	40.3	28.9			
4/1 1:30 P	30	28	4.20		7.00	40.3	28.9			
	35	28	4.05		7.00	40.3	33.0		4.1	82
	35	33	4.05		7.00	40.2	33.7			

Tx Sat. C.U. Conf. Press ___ psi over Bp   Page - 2

Backpressure Saturation Data.   Cell - 10

Tested by [illegible]   Date 4/1/88

Job No 21-87035   Boring No 8   Sample No 8

Test No ___   Depth 20-22

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs	BP Burette cc's	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
4/1 5 P	35	33	4.00		7.00	40.2	34.2			
	40	33	3.80		7.00	40.2	38.4		4.2	84
	40	38	3.80		6.95	40.1	38.7			
4/4 955 A	40	38	3.70		7.00	39.5	38.8			
	45	38	3.50		7.00	39.5	43.6		4.8	96
	45	43	3.50		6.95	39.4	43.9			

ĀTEC Associates, Inc. Ce -4

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM CPC Lab. No. 21-87035
PROJECT General Motor Norwood
Boring No. B-11 Sample No. 8 Depth 16'-18'
Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 53.3	TOP (Cm.) 31.4	CELL (In.)	FLOW, Q (cm³) IN	OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				43	40	45				
4/4/88	13:50 p			5.10	6.5	4.30				
	16:20			4.95	12.4	4.20				
4/5/88	9:00a	69000		3.90	35.0	4.25		9.03		7.6×10^{-8}
				(Drained top Burrette to			7.2)			
	15:35			3.55	15.7	4.20				
4/6/88	9:26	87960		2.60	35.2	4.10		8.87		6.0×10^{-8}
	15:10			2.50	39.2	4.10	Top			
				Drained top		to 10.4	59.0			
4/7/88	9:30	86640		1.50	30.2	4.10		7.54		5.9×10^{-8}
									Ave.	6.5×10^{-8}

D — 2.86 7.26
H — 2.12 5.38

*h = (Bottom Burette Pressure - Top Burette Pressure) ± Elevation Difference of Top and Bottom Burette Water Levels

TX Sat. C.U. Conf. Press ___ psi over Bp — Page – 2

Backpressure Saturation Data — Cell – 4

Tested by Sef — Date 3/31/88

Job No 21-87035 Boring No 11 Sample No ____

Test No ____ Depth 16-18

Date & Time	Cell σ_3 psi	T+B σ_{BP} psi	Ext Burette Divs Cell	Ext Burette cc's	BP Burette Divs Bot	BP Burette cc's Top	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3/31 4 10/P	15	13	5.75		6.10	40.2	14.3			
	20	13	5.50		6.10	40.0	18.2		3.9	78
	20	18	5.50		6.10	39.7	19.3			
4/1 10 05/A	20	18	5.40		6.05	39.0	19.5			
	25	18	5.20		6.05	38.9	23.7		4.2	84
	25	23	5.20		6.00	38.8	24.4			
4/1 1 15/P	25	23	5.15		6.00	38.7	24.3			
	30	23	5.00		6.00	38.6	28.6		4.3	.86
	30	28	5.00		6.00	38.5	28.9			
4/1 4 35/P	30	28	5.00		6.00	38.3	29.1			
	35	28	4.80		6.00	38.2	33.5		4.4	88
	35	33	4.80		5.95	38.1	34.0			
4/4 9 45/A	35	33	4.70		5.15	54.3	33.9			
	40	33	4.50		5.15	54.3	38.5		4.6	92
	40	38	4.55		5.15	54.2	38.9			
			4/4 drained Top down to 33.2							
4/4 1 15/P	40	38	4.50		5.15	33.2	38.9			
	45	38	4.35		5.10	33.2	43.6		4.7	94
	45	43	4.30		5.10	33.2	43.7			

Tx Sat. C.U. Conf. Press ___ psi over Bp — Page-1

Backpressure Saturation Data. — Cell-4

Tested by Sef — Date 3/29

Job No 21-87035 Boring No. 11 Sample No ___

Test No ___ Depth 16-18

131.4
116.8
14.6

Date Time	Cell σ_3 psi	T+B σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B=\frac{\Delta u}{\Delta\sigma_3}$
3/29 5 12/P	0	0	7.25		7.25	36.2	0.4			
	10	0	5.95		7.25	36.1	6.7			
	10	8	5.95		7.10	35.2	9.5			
3/30 9 50/A	10	8	6.00		6.55	29.5	9.6			
	15	8	5.70		6.55	29.4	13.2		3.6	72
	15	13	5.70		6.50	29.0	14.5			
3/30 1 45/P	15	13	5.70		6.45	28.5	14.4			
	20	13	5.50		6.45	28.4	18.2		3.8	.76
	20	18	5.50		6.40	28.1	19.3			
3/30 4 45/P	20	18	5.50		6.40	27.4	19.2			
	25	18	5.10		6.40	27.3	23.1		3.9	78
	25	23	5.10		6.40	27.0	24.1			
3/31 10 30/A			(rod	blew out)	start sat. over					
3/31 10 45/A	0	0	7.15		6.10	39.5	1.0			
	10	0	6.30		6.05	38.8	11.0			
	10	8	6.15		6.10	40.3	9.8			
3/31 1 25/P	10	8	6.05		6.10	41.0	9.6			
	15	8	5.80		6.10	40.8	13.7		4.1	82
	15	13	5.80		6.10	40.5	14.3			

Ci ' 5

ĀT Associates, Inc.

TRIAXIAL PERMEABILITY TEST DATA SHEET

CLIENT GM CPC Lab. No. 21-87035
PROJECT General Motors Norwood
Boring No. B-12 22" rec Sample No. 8* Depth 16-18'
Sample Description

DATE	TIME	ELAPSED TIME (hours)	TEMP. in °C	BURRETTE READING BOTTOM (In.) 53.6	BURRETTE READING TOP (Cm.) 31.3	CELL (In.)	FLOW, Q (cm³) IN	FLOW, Q (cm³) OUT	DIFFERENTIAL HEAD, h* (Cm.)	PERMEABILITY (Cm./sec.)
				48	45	50				
3-28	13:57			6.95	9.9	3.60				
3-28	17:28			6.95	11.5					
3-29	8:59	68520		6.75	14.9			1.58		1.3×10^{-8}
3-29	17:22			6.70	16.7					
3-30	8:37	85080		6.60	18.5			1.14		7.5×10^{-9}
3-30	16:53			6.55	19.3					
3-31	11:04	95220		6.15	27.0			2.69		1.6×10^{-8}
									Ave =	1.2×10^{-8}

D — ~~2.86~~ 7.26
H — ~~2.12~~ 5.38 cm

*h = (Bottom Burette Pressure - Top Burette Pressure)
± Elevation Difference of Top and Bottom Burette Water Levels

Tx Sat. C.U. Conf. Press ___ psi over Bp   Page – 2

Backpressure Saturation Data.   Cell – 5

Tested by GLP   Date 3-28

Job No ________ Boring No 12 ______ Sample No –

Test No ____ Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B = \frac{\Delta u}{\Delta \sigma_3}$
3-8 1:13	40	38	4.00	~~38~~	6.95	33.3	39.6			
	45	38	3.85		6.95	33.3	44.2	—	4.6	92
	45	43	3.85		6.95	33.3	44.5			
3-28 46	45	43	3.80		6.95	33.3	44.3			
	50	43	3.65		6.95	33.3	49.1	—	4.8	9.6
	50	48	3.65		6.95	33.3	49.2			

TX Sat. C.U. Conf. Press ___ psi over Bp — Page - 1

Backpressure Saturation Data. — Cell - 5

Tested by GLP — Date 3-24

Job No 21-87035 Boring No 12 Sample No —

Test No ___ Depth 16-18

Date Time	σ_3 psi	σ_{BP} psi	Ext Burette Divs	Ext Burette cc's	BP Burette Divs (B)	BP Burette cc's (T)	Pore Pressure, psi Rdg	Pore Pressure, psi Corr	Δu, psi	$B=\frac{\Delta u}{\Delta\sigma_3}$	
3-? 3 07	0	0	7.05		7.20	38.0	0.4				
	10	8	5.90		7.20	38.0	11.1	—			
	10	8	5.85		7.20	38.8	10.3				
3-24 ?12	10	8	5.60		7.20	37.5	10.3				
	15	8	5.35		7.20	37.4	14.2	—	3.9	78	
	15	8	5.35		7.20	36.9	15.3				
-25 ?:42	15	13	5.15		7.10	35.1	15.3				
	20	13	4.95		7.10	35.0	19.3	—	4.0	80	
	20	18	4.95		7.10	34.8	20.1				
3-25 1:03	20	18	4.85		7.10	34.4	19.9				
	25	18	4.65		7.10	34.4	23.9	—	4.0	80	
	25	23	4.70		7.10	34.2	24.7				
-5 5:07	25	23	4.65		7.10	34.0	24.7				
	30	23	4.50		7.10	33.9	29.1	—	4.4	88	
	30	28	4.50		7.10	33.8	29.7				
3-6 ?21	30	28	4.45		7.05	33.3	29.8				
	35	28	4.25		7.05	33.2	34.1	—	4.3	86	?
	35	33	4.25		7.05	33.1	34.8				
3-8 ?:40	35	33	4.25		7.00	33.1	34.8				
	40	33	4.10		7.00	33.0	39.2	—	4.3	86	?
	40	38	4.10		7.00	33.0	39.8				

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client GM CPC

ATEC Project No. 21-87035

Project General Motor Norwood

Client Job No.

Location

Date

Boring No. B- Sample No. Depth 16'-18' ft Recovery 23½ in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
V_{G_1}		
6		
V_{G_2}		
12		
V_{G_3}		
18		
γ^x_1		
	CEC 201	
V_{G_4}		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client GM CPC

ATEC Project No. 21-87035

Project General Motors Norwood

Client Job No.

Location

Date 3/17/88

Boring No. 1 Sample No. Depth 16-18 ft. Recovery in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
Vis 1	Clay with Gravel	Firm
6		
Vis 2		
	CFC Col	
12		
γ^*		
Vis 3		
18	Cut Bottom of Tube	
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client G.M.-CPC

ATEC Project No.

Project

Client Job No.

Location

Date

Boring No. 2   Sample No.   Depth   ft.   Recovery   in.

Ground Surface Elevation   Datum   Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
6		
12		
18		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client: GM CPC

ATEC Project No.

Project:

Client Job No.

Location:

Date:

Boring No. B-5 Sample No. Depth 20-22 ft Recovery 20 in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
Vis.	Clay with gravel	Soft
6		
Vis 2		
12		
Vis 3		
18		
Vis 4		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client ____ ATEC Project No. ____

Project ____ Client Job No. ____

Location ____ Date ____

Boring No. 7 Sample No. ____ Depth ____ ft. Recovery ____ in.

Ground Surface Elevation ____ Datum ____ Logged By ____

Scale, inches	Soil Description	Laboratory Tests / Remarks
0	trace of gravel	
6		
12		
18		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client GM CPC

ATEC Project No. 21-37035

Project General Motors Norwood

Client Job No.

Location

Date 3/17/88

Boring No. 8 Sample No. Depth 20-22 ft Recovery in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
	Tan clay	Silty
6		
	C-C & Col	
		Firm
12		
	cut bottom of tube	
18		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client GM CPC

ATEC Project No. 21-87035

Project General Motors Norwood

Client Job No.

Location

Date 3/23/88

Boring No. B-11 Sample No. Depth 16-18 ft Recovery 13 in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0		
	w/ gravel	
6		
		Firm
12		
	[illegible]	
18		
24		
30		

ATEC Associates, Inc.

LABORATORY THINWALL TUBE LOG

Client: GM CPC

ATEC Project No. 21-87635

Project: General Rains Plywood

Client Job No.

Location

Date: 3/17/88

Boring No. 3 Sample No. Depth 16-18 ft Recovery in.

Ground Surface Elevation Datum Logged By

Scale, inches	Soil Description	Laboratory Tests / Remarks
0	wax	
	gravel	
6		
12		
18	CEC + LOI	
24		
30		

APPENDIX
E

SITE EVALUATION

RCRA CLOSURE
GM-CPC
NORWOOD, OHIO

Appendix E

Statistics and Calculations

Atec Associates
Geotechnical and Materials Engineers

CLIENT: GENERAL MOTORS
PROJECT: RCRA CLOSURE PLAN
NORWOOD, OHIO

FILE NUMBER: 21-87035
SHEET 1 OF 11
DATE 5-1-88
COMPUTED BY
CHECKED BY

DATA

TANK PIT #1

SAMPLE	As	Ba	Cd	Cu	Cr	Hg	Pb
B-1E	10.5	<49.4	0.299	<0.72	15.1	0.48	9.21
B-1G	10.6	<44.2	0.247	<0.64	17.2	0.33	10.0
B-1H	10.8	198	<0.215	<0.65	15.7	0.18	10.6
B-2E	6.4	82.7	<0.26	<0.69	17.7	0.17	25.4
B-2G	8.5	117	<0.206	<0.74	14.9	0.23	20.9
B-2H	8.3	<41.4	<0.207	<0.62	12.0	0.37	8.2
B-3E	10.7	<70.9	<0.365	<0.71	16.8	0.17	7.81
B-3G	5.6	<69.4	<0.347	<0.64	22.3	0.13	7.53
B-3H	5.5	<69.3	<0.346	<0.58	21.0	0.21	9.31
B-4E	5.4	<68.4	<0.342	<0.60	12.4	0.11	17.5
B-4G	6.8	<62.7	<0.311	<0.71	22.3	0.10	12.9
B-4H	6.6	<63.9	<0.320	<0.57	16.3	0.094	12.2

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER
SHEET 2 OF 11
DATE
COMPUTED BY
CHECKED BY

DATA

TANK PIT NO. 2

SAMPLE	As	Ba	Cd	Cr	Pb
B-5H	7.51	< 75.8	0.43	19.2	8.1
B-5I	5.38	< 61.8	< 0.31	16.5	8.3
B-5J	4.42	131.0	0.74	25.3	2.1
B-6F	3.47	< 41.6	< 0.21	10.3	11.1
B-6G	3.57	< 40.1	< 0.21	8.25	12.9
B-6H	3.33	< 42.1	< 0.21	10.5	11.6
B-7E	5.39	131.0	< 0.2	12.8	13.5
B-7H	5.08	81.3	< 0.22	11.0	9.1
B-7I	4.66	< 39.3	0.24	12.6	8.5
B-8F	3.47	< 42.1	< 0.21	8.5	4.8
B-8H	14.1	70.1	< 0.193	14.1	8.9
B-8I	3.19	< 45.5	< 0.23	13.0	12.7

DATA

TANK PIT NO. 3	AS	Ba	Cd	Cr	Hg	Pb
B-9E	4.96	57.3	0.26	13.5	0.05	12.5
B-9F	3.23	<43.0	0.23	11.0	<0.06	39.5
B-9G	3.00	73.6	<0.21	13.0	<0.06	21.7
B-10E	2.15	<38.3	<0.19	9.9	<0.06	4.8
B-10F	3.67	47.8	0.25	15.7	<0.073	12.5
B-11F	3.45	<36.6	0.193	19.5	<0.087	7.56
B-11G	3.9	<42.7	<0.213	13.2	<0.099	6.10
B-11H	3.97	<45.4	<0.227	17.3	<0.083	7.92
B-12F	10.3	<47.6	<0.238	11.9	<0.092	9.0
B-12G	11.5	418.0	0.377	22.7	<0.073	7.2
B-12H	5.56	39.6	0.769	33.0	<0.053	11.7

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER
SHEET 4 OF 11
DATE
COMPUTED BY
CHECKED BY

DATA

Back-Ground

SAMPLES	As	Ba	Cd	Cr	Hg	Pb
BG-1A	7.1	132	<0.33	22.3	<0.09	11.8
BG-1B	9.9	136	0.45	19.2	<0.13	13.9
BG-1C	4.4	<66.6	<0.33	20.2	0.61	6.6
BG-2A	4.6	<66.5	<0.33	10.8	<0.09	4.8
BG-2B	7.4	<66.7	<0.33	19.9	<0.10	8.3
BG-2C	7.6	161	<0.33	19.4	<0.10	10.5
BG-3A	4.8	559	<0.25	13.1	<0.10	17.3
BG-3B	7.8	262	0.27	14.4	0.10	14.1
BG-3C	5.5	<64.2	<0.32	16.1	<0.11	4.0
BG-4A	3.4	235	<0.25	14.7	<0.1	13.4
BG-4B	7.0	207	0.41	28.2	0.16	20.0
BG-4C	4.8	834	<0.27	13.7	1.7	9.6

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER

SHEET 5 OF 11

DATE

COMPUTED BY

CHECKED BY

CALCULATIONS

TANK PIT #1

	As	Ba	Cd	Cr	Hg	Pb
Number of Samples (N_w)	12	12	12	12	12	12
MEAN OF SAMPLES ($\bar{x}_w$)	8.02	78.1	0.29	17.3	.22	12.6
VARIANCE OF SAMPLES (s_w)	4.9	185.3	.003	12.3	0.014	32.5

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER

SHEET 6 OF 11

DATE

COMPUTED BY

CHECKED BY

CALCULATIONS

TANK Pit # 2

	As	Ba	Cd	Cr	Pb
Number OF SAMPLES (N_w)	12	12	12	12	12
MEAN OF SAMPLES ($\bar{X}_w$)	5.3	66.8	.28	13.5	16.6
VARIANCE OF SAMPLES (S_w)	9.1	1158.8	.025	23.7	496.2

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER

SHEET 7 OF 11

DATE

COMPUTED BY

CHECKED BY

CALCULATIONS

TANK PIT #3

	As	Ba	Cd	Cr	Hg	Pb
Number OF SAMPLES (Nw)	11	11	11	11	11	11
MEAN OF SAMPLES ($\bar{X}_w$)	4.3	81.1	.07	16.9	.07	12.8
VARIANCE OF SAMPLES (S_w)	~~[illegible]~~ 7.2	~~[illegible]~~ 12591.6	.03	~~[illegible]~~ 43.8	.003	~~[illegible]~~ 99.9

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER
SHEET 8 OF 11
DATE
COMPUTED BY
CHECKED BY

CALCULATIONS
BACKGROUND

	As	Ba	Cd	Cr	Hg	Pb
Number OF Samples (N_b)	12	12	12	12	12	12
Mean OF Samples ($\bar{X}b$)	6.2	194.7	.32	17.7	.23	11.2
VARIANCE OF SAMPLES (S_b)	3.6	52316	.0036	232	.22	23.7
STANDARD DEVIATION (S)	1.9	228.7	.06	4.8	.47	4.9
$\bar{X}+2S$	10	652.1	.44	27.3	1.22	21

Atec Associates
Geotechnical and Materials Engineers

CLIENT ______

PROJECT ______

FILE NUMBER ______
SHEET 9 OF 11
DATE ______
COMPUTED BY ______
CHECKED BY ______

CALCULATIONS
TANK Pit # 1

(T VALUE)

As $$\frac{8.1 - 6.2}{\frac{(12)(4.5)^2 + (11)(3.6)^2}{23}(.16)} = 0.71 \qquad (2.179)$$

Ba $$\frac{85.0 - 194.7}{\frac{(12)(2285.6)^2 + (11)(5223.6)^2}{23}(.16)} = -5\times10^{-7} \qquad ''$$

Cd $$\frac{.29 - .32}{\frac{(12)(.003)^2 + (11)(.0236)^2}{23}(.16)} = -1721.4 \qquad ''$$

Cr $$\frac{17.6 - 17.7}{\frac{(12)(11.3)^2 + (11)(23.2)^2}{23}(.16)} = -5\times10^{-5} \qquad ''$$

Hg $$\frac{.230 - .28}{\frac{(12)(.05)^2 + (11)(.22)^2}{23}(.16)} = -13.4 \qquad ''$$

Pb $$\frac{12.6 - 11.2}{\frac{(11)(32.5) + (11)(23.7)}{23}(.17)} = .01 \qquad (2.201)$$

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER

SHEET 10 OF 11

DATE

COMPUTED BY

CHECKED BY

CALCULATIONS

TANK PIT #2

(T VALUE)

As $\dfrac{5.3-6.2}{\sqrt{\dfrac{(11)(9.1)^2+(11)(3.6)^2}{22}}\,(.17)} = -0.11$ (2.201)

Ba $\dfrac{66.8-194.7}{\sqrt{\dfrac{(11)(1158.3)^2+(11)(5231.6)^2}{22}}\,(.17)} = -5\times10^{-7}$ "

Cd $\dfrac{.28-.32}{\sqrt{\dfrac{(11)(.025)^2+(11)(.0036)^2}{22}}\,(.17)} = -737.6$ "

Cr. $\dfrac{13.5-17.7}{\sqrt{\dfrac{(11)(23.7)^2+(11)(23.2)^2}{22}}\,(.17)} = -0.04$ "

Pb $\dfrac{16.6-11.2}{\sqrt{\dfrac{(11)(496.2)^2+(11)(23.7)^2}{22}}\,(.17)} = 3\times10^{-6}$ "

Atec Associates
Geotechnical and Materials Engineers

CLIENT

PROJECT

FILE NUMBER

DATE

COMPUTED BY

CHECKED BY

CALCULATIONS

TANK Pit #3

(T VALUE)

As $\dfrac{4.3-6.2}{\sqrt{\dfrac{(10)(7.2)+(11)(3.6)}{21}}\,(.17)} = -0.36$ 2.228

Ba $\dfrac{811-194.7}{\sqrt{\dfrac{(10)(12591)+(11)(50316)}{21}}\,(.17)} = -4\times10^{7}$ 〃

Cd $\dfrac{.27-.32}{\sqrt{\dfrac{(10)(.03)+(11)(.0036)}{21}}\,(.17)} = -675.6$ 〃

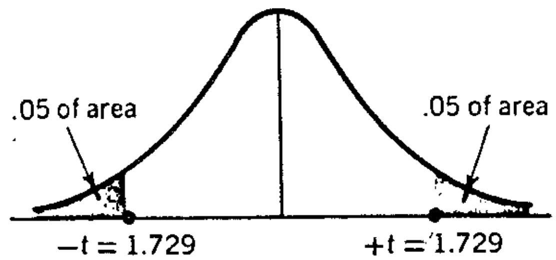
Cr $\dfrac{16.9-17.7}{\sqrt{\dfrac{(10)(43.8)+(11)(23.2)}{21}}\,(.17)} = -0.004$ 〃

Hg $\dfrac{.07-.28}{\sqrt{\dfrac{(10)(.0503)+(11)(.22)}{21}}\,(.17)} = -48.7$ 〃

Pb $\dfrac{12.8-11.2}{\sqrt{\dfrac{(10)(99.9)+(11)(23.7)}{21}}\,(.17)} = .002$ 〃

APPENDIX TABLE 2

Areas in Both Tails Combined for Student's *t* Distribution.*



EXAMPLE: To find the value of *t* which corresponds to an area of .10 in both tails of the distribution combined, when there are 19 degrees of freedom, look under the .10 column, and proceed down to the 19 degrees of freedom row; the appropriate *t* value there is 1.729.

Degrees of freedom	Area in both tails combined			
	.10	.05	.02	.01
1	6.314	12.706	31.821	63.657
2	2.920	4.303	6.965	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.015	2.571	3.365	4.032
6	1.943	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921
17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845
21	1.721	2.080	2.518	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	1.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660
120	1.658	1.980	2.358	2.617
Normal Distribution	1.645	1.960	2.326	2.576

* Taken from Table III of Fisher and Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Group Ltd., London (previously published by Oliver & Boyd, Edinburgh) and by permission of the authors and publishers.

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